

MOTOR AGE

Volume XXXV
Number 1

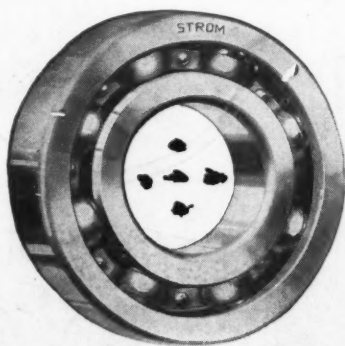
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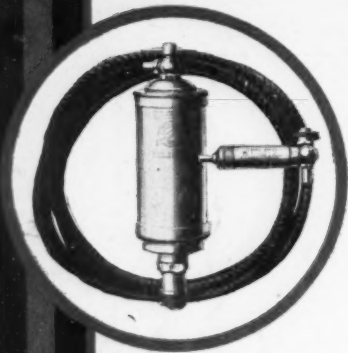


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Wrench
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MOTOR AGE

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 MALLERS BUILDING
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No. 1

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MOTOR AGE

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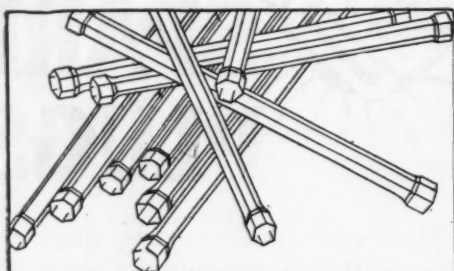
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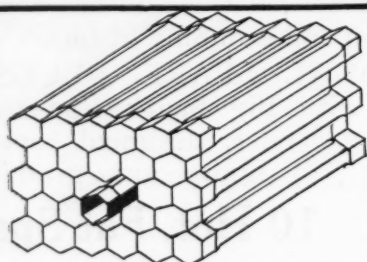


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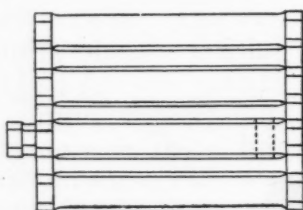
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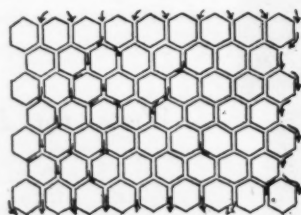
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Top view, showing how any tubes may be extracted and replaced without disturbing the others.



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Buffalo, N. Y.

MOTOR AGE



Trucks such as these at Baltimore are not to be dumped on the market now peace is here

Government to Protect Markets

Will Not Dump Surplus Motor Vehicles—
To Observe Interests of Maker and Dealer

By Fred M. Loomis

Motor Age Editorial Staff

ONE—No automotive equipment will be dumped on the market by the Government from the surplus left after the war.

2—Requirements of the Government for the maintenance of a considerable army abroad for an indefinite time to come will absorb all the standard trucks now built or in process.

3—Trucks not adapted for military service will be utilized by the Postoffice Department in extending the parcel post system and other ways. The Forest Service is also expected to take a large quantity of equipment.

4—Trucks, motor cars and other equipment now in Europe probably will stay there, either being used up in the service of the United States or taken over by some of the foreign governments.

5—Surplus airplane engines not available for aircraft will be diverted to some other use. Experiments now are being conducted, for instance, looking to the possible adaptation of the 1500 Hall-Scott airplane engines which have been on hand for four months for use in artillery tractors. In any event, they will be disposed of in such a way that neither market nor labor con-

ditions will be disturbed. Liberty aviation engines are now employed in British and American tanks.

6—The Surplus Stock Division of the Government is trying to find means for the disposal of surplus materials and stocks of every kind so that everything may be absorbed naturally and gradually without disturbance to industry, prices or labor.

7—A preferential market, consisting of governmental and semi-governmental agencies such as the Navy, the Postoffice Department, the Indian Purchase Office of the Department of the Interior, the Panama Canal, the Red Cross, the Y. M. C. A., the Emergency Fleet, the Belgian Relief Commission, other relief organizations and foreign governments will take a large quantity of goods and thus relieve the home market of the task of absorption.

8—No selling to private parties or to concerns who desire to profit at the expense of the government and the people will be tolerated. Nothing will be offered for sale until every possible consideration has been given as to what effect the offering will



Some of the cars and trucks that moved from Detroit to the seaboard in a steady stream

have upon the normal market conditions, the maintenance of normal prices and labor conditions.

9—The advice and suggestion of different industries and organizations will be sought and followed in all instances where the Government has not the assurance that the goods offered will not disturb normal conditions.

MOTOR truck and car makers, like other business men of the country, have been keenly apprehensive lest the large surplus stocks of materials, products and equipment left in the hands of the Government by the cessation of hostilities be thrown upon the market, with a consequent disturbance of market and price conditions. Present indications are that business men need have no fear that anything of the kind will happen. There is official assurance to the effect that the utmost precautions will be taken in order that as little disturbance as possible of normal trade and market conditions shall follow the disposal of the stocks which the Government

still has on hand and which, in some lines at least, are admittedly huge.

Business may rest assured that matters both large and small will be taken into consideration and that the procedure of disposing of materials adopted by the Government will be comprehensive both in action and import. Every safeguard will be thrown around the market to prevent sudden price depressions, sudden decrease of production and the consequent disturbance of labor conditions.

What is called a preferential market will be given first opportunity to absorb the goods on hand. This market consists of Governmental and semi-Governmental

10—In every instance where it is practicable it is the intention to give the manufacturer who furnished the article the first opportunity to re-purchase, so that if he so desires the goods never will reach the open market except through his channels and by his own distribution. In other words, he can buy in the trucks and put them on the market gradually.

agencies at home and relief commissions and foreign governments abroad. As an instance of what is meant, negotiations now are under way to sell to the Russian bureau of the war board millions of dollars worth of clothing to be shipped to Siberia. The Belgian relief commission also has taken huge quantities of goods and will take more. Montenegro, Ecuador and the Netherlands likewise are negotiating for supplies.

Trucks for Mail

Domestically thousands of motor trucks, for instance, will be turned over to the Postoffice Department under authority already given by law. The Forest Service of the Department of Agriculture also is expected to take a large quantity of equipment, and other Governmental agencies will absorb a lot. In fact, no one knows yet what the requirements of the Government will be in the matter of trucks and other automotive equipment, and it is doubtful if any now in the possession of the Government or any of that still to be delivered to the Government will find its way onto the market, with the possible exception of some trucks which have been found to be too light for military uses. Even in the case of this exception, some disposition will be found for the surplus which will not disturb the market.

The fundamental thought underlying the procedure in the disposition of surplus stocks is to find if possible some means of adaptation or some application of the materials and products so that they may be absorbed gradually and naturally. As an instance of this intent attention is called to the experiment now being conducted looking toward the utilization of the Hall-



Few of the motor vehicles in this garage overseas will return

Scott airplane engines in artillery tractors. The Government has had 1500 of these engines on hand for over four months, yet not one has been offered for sale, and none will be until it can be disposed of in a way that will not affect industry adversely.

But there is hardly a chance for even the foreign governments to get any. It is known that Pershing is calling for more trucks for use in Europe. The available supply now is insufficient for the needs of the Army of occupation. As an indication of the quantities of automotive materials required to maintain the trucks now in use abroad in commission, showing also how unlikely it is that any large portion of it can be brought back to this country, an observer reports that he saw a single pile of tires 35 ft. high and three blocks square.

Little to Return from Europe

Assertion is made that none, or at the most a very small part, of the automotive equipment now in Europe belonging to the Government ever will be returned to this country. No one can say at this time how long a big United States Army will be needed abroad. It is certain, however, that hundreds of thousands of men will be there for many months yet, and the maintenance of this force will require all the automotive and transport equipment now there. If there should be any surplus over United States requirements, it likely will be taken over by France or some other foreign government, regardless of the 30,000 trucks which have been delivered to the allies by Germany.

Of course, there naturally will be a surplus of engines of some kinds. This is particularly true of the Liberty aviation engine. It is reliably reported that the Government already has something like 10,000 of these engines on hand, and when those now being finished and under contract are delivered it is said the Government will have from 10,000 to 20,000 of them which will find their way into Government storehouses.

What to do with these engines will be something of a problem. Owing to their high-speed construction and excessive gasoline consumption, running as high as 30 g.p.h., they cannot be used economically

THE War Department authorizes the following:

The Director of Munitions hereby contradicts the statement in the newspapers to the effect that the Government intends to put on sale at once all trucks and motor passenger cars that are not being used in the service. The fact is that all trucks owned by the Government will be needed in the service for some time to come. In the disposal of surplus property every care will be taken to see that it is sold in a manner best adapted to cause as little disturbance to the trade as possible.

in the postal service. Some of them doubtless will be utilized in what further expansion of the Army and Navy aviation departments is authorized, but no one at this time can tell how extensive this will be. Some use for them, of course, will be found, but it is certain that they cannot come upon the market in any way or manner which will disturb business conditions.

That the Government prefers to suffer a loss rather than run the risk of disturbing market conditions colors the attitude of the Surplus Stocks Division, which will have charge of the disposition of surplus stocks, toward possible sales. If the division felt it could offer to-day a large quantity of any certain item that might be on hand and that a certain satisfactory price could be obtained for it, but by so doing industrial or labor conditions might be in any way upset, the division would disregard entirely the possibility of any future depreciation and would await the time when such article gradually could be absorbed without any accompanying ill effects.

Also it is the purpose of the Surplus Stocks Division to take advice from the men who would be most likely to be affected by the disposition of the surplus stocks. L. H. Hartman, chief of the division, who addressed the Chicago Association of Commerce at luncheon last Friday, said:

"The advice and suggestions of different

industries and organizations will be sought and followed in all instances where we have not every assurance that our offering will not disturb normal conditions. We are not possessed of a force of experts that can tell us without hesitation just what quantity of any article the market can normally absorb. This information will be sought from the particular industry involved. It is our purpose to divert everything as far as possible into its original and proper channels so that the manufacturers need not regard us as a competitor. With this end in view we will, in every instance where it is in any way practicable, give the manufacturer who furnishes the article to the Government the first opportunity to re-purchase. If he sees fit to do so, his goods will never reach the open market except through his own channels and by his own distribution. Conferences have already been had with representatives from many different industries with the result that committees have been appointed with whom we will consult before taking action."

To Protect from Individuals

The market also will be protected from the operation of private individuals or firms who see in the present situation a hope of being able to buy cheaply from the Government and then to sell at higher prices to the people, thereby enriching themselves at the expense of both Government and people. Mr. Hartman says the mails are burdened daily with hundreds of letters from such would-be profiteers, but in every instance they have been ignored. In this connection he assures the country that such projects will not be tolerated, and as far as possible the surplus stocks will be marketed through regular channels. No secrecy or privacy will be allowed in any of the sales, but on the contrary they will be conducted only after the widest advertising, with everyone given an equal opportunity to purchase.

An inventory of all stocks on hand will be taken Jan. 1, and as soon as complete information is available catalogs will be issued for the use of state, county and municipal officials in the hope of finding still another outlet in this direction for much of the materials on hand.



This is another army of Liberty trucks turned out by the industry for the Government, few of which, if any, will know peace-time civilian duty

Will Exhibit Aircraft in New York

Makers to Stage Exposition in Madison Square Garden in March

NEW YORK, Dec. 30—There will be an aircraft exposition in New York Feb. 27-March 6. The Aircraft Manufacturers' Association has obtained an option on Madison Square Garden for that week, and though definite plans for the show have not been completed, it is stated that sufficient exhibitors are assured to make the event the most complete of its kind ever held.

Complete plans for the show are to be made public at a dinner to be held by the Aircraft Manufacturers' Association at the Waldorf Jan. 7. It is expected that probably 500 persons will attend, including as guests of honor representatives of the military, legislative and executive branches of the Government. Arrangements for the dinner are in the hands of J. G. White of the J. G. White Engineering Co.

It is planned to make the exhibit truly international in character. It will include exhibits of various American and Allied military airplanes as well as exhibits of engines and accessories.

The show has been made possible by the revocation of the Presidential proclamation forbidding aircraft exhibitions as inimical to the best interests of the country during the course of the war. This proclamation was issued Jan. 1. Recently the Aircraft Manufacturers' Association took up with Washington the matter of holding a show now that the war has ended. The War Department apparently was willing to extend its co-operation but could do nothing in view of the President's proclamation.

The matter was then presented to the Judge Advocate General with the result that the whole matter was cabled to France. In the meantime the State Department had prepared a new order rescinding the former one and this, in turn, was cabled abroad for the President's approval. In consequence, the following statement has been made public by Washington:

"At the request of the Secretary of War, the president has authorized the issuance of a proclamation revoking the proclamation of last January prohibiting the exhibition of aircraft during the war. Pending the formal signing of the new proclamation, the Secretary of State has requested the Attorney-General not to prosecute any infringement of the earlier proclamation."

To Consider Fuels

NEW YORK, Dec. 30—The program for the winter meeting of the Society of Automotive Engineers to be held in the Engineering Societies Building, New York, Feb. 4-6, is rapidly rounding into shape. Among other engineering discussions, considerable time will be devoted to the fuel situation, and it is stated that an authoritative statement regarding the new Liberty fuel will be made.

The fuel discussion will be lead by President C. F. Kettering, who will summarize the situation to date with particular reference to the need for improving the thermal efficiency of engines. In addition there will be an analysis of the supply of petroleum in the United States by a representative of the U. S. Geological Survey and a discussion of modern refinery practice. Dr. Joseph E. Pogue of the Bureau of Oil Conservation of the Bureau of Mines will present an interpretation of the fuel situation.

It is expected that that portion of the sessions devoted to aircraft matters will be of prime importance. J. G. Vincent, formerly lieutenant-colonel and chief of the airplane engineering division of the Bureau of Aircraft Production, will deliver a paper on engines of the fixed type with radially-arranged cylinders. He also will give a lot of information on the Liberty engine in addition to what already has become public. A paper on proportioning planes to their engines is in course of preparation.

Henry M. Crane, vice-president and chief engineer of the Wright-Martin Aircraft Corp., will address the gathering on the effect of aeronautic experience on motor car design and construction.

Maj. Arthur B. Browne is scheduled to present a paper on "Better Truck Performance." The future development of lighter and more efficient passenger cars will be discussed by A. Ludlow Clayden, consulting engineer of the Wright-Martin Aircraft Corp. D. McCall White will talk on light, efficient motor car engines.

NEW YORK DRAWS SPACE

New York, Dec. 28—Drawing for space for the passenger car section of the New York show was made to-day. Practically all the space for cars in both Madison Square Garden and the armory were taken.

Drawing for space for trucks will take place next Saturday.

Eight spaces of 400 sq. ft. each were left when the drawing closed, and applications from non-members insure the taking of these also. Space in the galleries and concert hall is being allotted to accessory exhibitors.

The total area available for cars and chassis in the Garden arena is 20,500 sq. ft., while the exhibition hall has about 5000 sq. ft. and the armory, 18,000. Exhibitors who obtained space in Madison Square Garden arena to-day include the representatives of the following makes of cars: Marmion, Locomobile, Stutz, Pierce-Arrow, Winton, Stearns, Packard, Oldsmobile, Oakland, Dodge Brothers, Studebaker, Peerless, Cadillac, Maxwell, Overland, Moon, Chandler, Haynes, Mitchell, Daniels, National and Buick.

Exhibitors in the exhibition hall include Cole, Chevrolet, Reo, Velie and Mercer.

The armory group includes Hupmobile, Nash, McFarlan, Lexington, Roamer, Standard, Westcott, Franklin, Chalmers, Apperson, Kissel, Buick, Paige, Owen-Magnetic, Murray, Crow-Elkhart, Saxon, Jordan, Hudson, King and Cunningham.

ST. LOUIS TO HAVE SHOW

St. Louis, Mo., Dec. 28—St. Louis will have a show. The exact date and the scope have been left to the show committee of the St. Louis Automobile Manufacturers and Dealers' Association to decide after the place is found. But the show will be about March 1. This decision was reached by the unanimous vote of the motor car and accessory dealers who gathered at the dinner given Thursday night by the association. Robert E. Lee, secretary of the association, will manage the show.

President F. W. A. Vesper of the N. A. D. A. urged the association as such and individual members to get behind the bond issue movement to have the city build a large entertainment hall, suitable for automotive shows. C. E. Lightfoot of the G. M. C. urged all to get behind any and all good roads movements, and he told them how many plans for motor truck express routes from the city had failed because



Motor cars and trucks are with our army of occupation, as this picture from the Meuse shows

of stretches of bad roads. Street Commissioner Talbert asked everybody to aid in finding a solution of the troublesome parking question. John F. Shurford, president of the Accessory Association, wanted a better showing of accessories at the show.

It was the first meeting since the influenza ban began working last fall and there was an excellent attendance. Most of the dealers appeared to have realized that they must take their places in lining up the industry and the general work of the country for the future.

KANSAS CITY SHOW PLACE

Kansas City, Mo., Dec. 28—Automotive dealers in Kansas City territory have recovered from the depression that followed the armistice and look forward to the show to raise the demand for cars, trucks and accessories to the peak.

The Kansas City association directors have decided on Convention hall as the place for the show, Feb. 24-March 1. More emphasis will be placed on trucks at this show, space for them being deducted from that formerly given passenger cars. Larger space for accessories is also figured on, which can be gained by extending the temporary balcony that served last year.

TOLEDO SHOW THIS MONTH

Toledo, Ohio, Dec. 28—The eleventh annual Toledo show will be held in the terminal auditorium Jan. 27-Feb. 1. Passenger cars, accessories, trucks and tractors will be shown, and a great increase in the number of tractor exhibits is assured.

The show will be staged by the Toledo Auto Shows Co., of which Hugo V. Buelow again has been selected manager.

SPOKANE TO HAVE SHOW

Spokane, Wash., Dec. 27—The Spokane Automobile Chamber of Commerce will stage a progressive automotive show Jan. 15-18. Every salesroom will be a display booth, and all will be fittingly decorated. Visitors are to be transported from salesroom to salesroom free of charge.

Chicago Allots Space for Big Show

Sixty-two Passenger Car and Twenty-seven Truck Applications

CHICAGO, Dec. 27—The "I Will" spirit of Chicago was manifested this afternoon with the drawing of space for the passenger car and truck shows to be held Jan. 25-Feb. 1 and Feb. 3-6 respectively.

As told in the issue of last week, Chicago dealers were offered the same order of drawing for space that the car manufacturers had last year, and manufacturers not represented in Chicago also were offered the space they had in 1918.

At 3 o'clock this afternoon the allotment meeting was held at the Lexington hotel. One hour was given for the filing of late applications, and at 4 o'clock promptly the allotment commenced with sixty-two applications from passenger car makers and twenty-seven from truck makers. The spaces allotted in the passenger car section are indicated in the following list:

Overland	D-1	Coliseum
Buick	C-5	Coliseum
Dodge	B-2	Coliseum
Studebaker	A-6	Coliseum
Maxwell	B-6	Coliseum
Chevrolet	D-5	Coliseum
Cadillac	D-3	Coliseum
Hudson	B-4	Coliseum
Packard	C-1	Coliseum
Reo	C-3	Coliseum
Oldsmobile	C-6	Coliseum
Oakland	A-2	Coliseum
Chandler	A-4	Coliseum
Paige	D-2	Coliseum
Pierce-Arrow	C-2	Coliseum
Chalmers	B-5	Coliseum
Mitchell	K-1	Coliseum
Hupmobile	D-4	Coliseum
Franklin	A-3	Coliseum
Haynes	D-6	Coliseum
Marmon	C-4	Coliseum
Nash	A-k	Coliseum
Velle	E-2	Coliseum
Cole	F-3	Coliseum
Dort	F-4	Coliseum
Winton	F-1	Coliseum
Grant	E-1	Coliseum
National	B-3	Coliseum
Kissel	F-2	Coliseum
Stearns	G-1	Coliseum
Briscoe	A-5	Coliseum
Stutz	M-1	Armory
Peerless	A-1	Armory
Premier	E-3	Coliseum

Lexington	J-1	Coliseum
Scripps	E-4	Coliseum
Mercer	B-1	Coliseum
Fiat	B-4	Armory
Westcott	H-2	Coliseum
Paterson	Q-1	Coliseum
Moline	G-2	Coliseum
Liberty	O-1	Coliseum
Jordan	P-1	Coliseum
Stephens	H-1	Coliseum
Elgin	O-2	Coliseum
Holmes	N-3	Coliseum
Essex	O-2	Coliseum
Locomobile	B-5	Armory
Daniels	Q-3	Coliseum
King	B-1	Armory
Case	B-3	Armory
Elcar	E-1	Armory
Davis	A-5	Armory
Standard	A-3	Armory
McFarlan	B-7	Armory
Biddle	C-1	Armory
Baker R & L	A-4	Armory
Owen Magnetic	A-2	Armory
Milburn	A-6	Armory
Detroit	A-8	Armory
Cunningham	B-6	Armory
Roamer	B-8	Armory

The electric vehicle section heretofore set aside in the armory will be continued. The concerns to which space is allotted in the truck section are:

Pierce-Arrow	Walker
G. M. C.	Paige
Autocar	Acme
Federal	Dearborn
Reo	LaPeer
Nash	Republic
Garford	Indiana
Locomobile	Clydesdale
Kissel	Bethlehem
Maxwell	Brockway
Velle	F-W-D
Chevrolet	Shaw
Master	Graham Brothers
Service	Sandow
Dodge Brothers	Gary

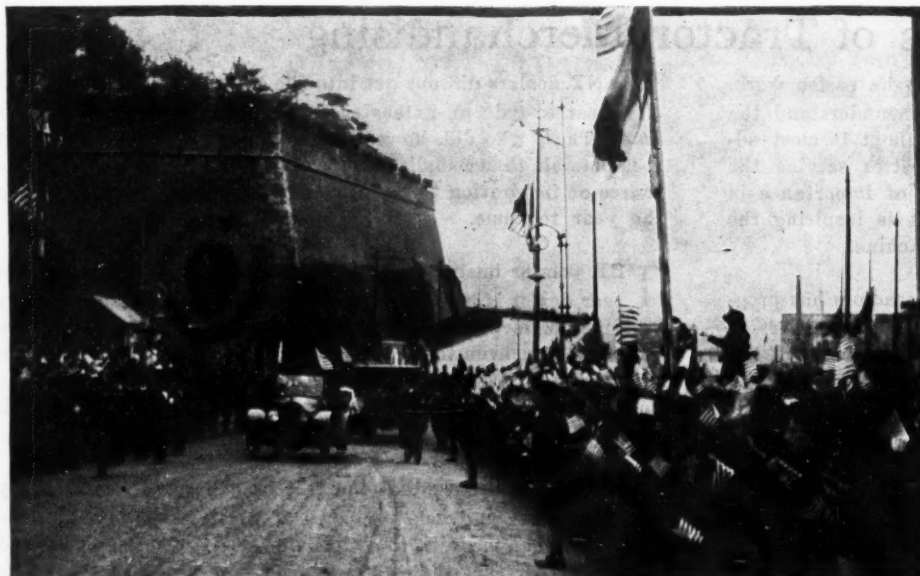
The show has been duly sanctioned by the Motor & Accessory Manufacturers' Association, who will make their allotment on or about Jan. 3. Thereafter, the remainder will be served as promptly as possible. Between fifty and sixty applications are on hand.

JOBBER'S TRIAL IS DELAYED

New York, Dec. 30—The trial of the twenty-one members of the jobbers' association on the charge of violating the Sherman anti-trust law has been postponed from Jan. 6 to Jan. 13, because Judge Hand, who is to try the case, at present is engaged with the postal telegraph demurrer action against the Government and will not be through with it until after Jan. 6.

ELIMINATING CAR TAX

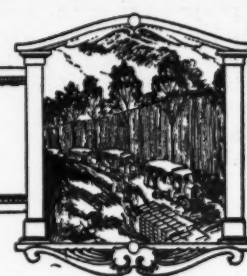
Washington, Dec. 27—An amendment proposed by Senator Johnson of South Dakota Tuesday to eliminate the proposed 5 per cent tax on motor trucks, motor truck trailers and tractors was passed by a vote of 33 to 28. This leaves the 5 per cent tax on passenger cars, motorcycles and parts and accessories in the bill. As the revenue bill was passed by the Senate it now goes to the general conference between the House and Senate committees. At this conference it is expected that recommendation will be made to remove the parts and accessories tax also. Following the conference the bill again will be presented to the House and the Senate for final approval.



Crowds lined the streets as the car of President Wilson passed by upon his arrival at Brest, France



EDITORIAL



A 1919 Business Message

FORGET that business has been under a war cloud. Forget that conditions have been in any way abnormal. Clear the mind of any thought that prices may go up or go down. Accept things as they are as the very best possible and get busy.

THERE is business to be got. Go get it.

WITH the return of peace come great opportunities. There never was a time when men in the automotive trades could do so much. The thing to look at now is the way to do things, not at any possible difficulties which may stand in the way of

doing them. Difficulties, anyway, like troubles, always come butt end first. Once met they peter out. Furthermore, the man who is busy has no time to think of difficulties.

BUSINESS can be got now. That is the thing to hold ever foremost in the mind. With that idea to the front the dealer will realize on the opportunities which present themselves, and it will make no difference to him whether he may have passed through a period of readjustment or not. He will not have noticed it for the reason that he will have been too busy getting business.

On With the Shows!

THE list of exhibitions steadily grows from day to day. Sponsored by the dealer in close co-operation with the manufacturer he represents, each exhibition waxes rich in prospects even thus far in advance, and when the show circuit swings into full speed during the coming month, there is every reason to believe it will be the beginning of a season most prosperous and happy.

CHARACTERISTIC Chicago hustle marks the preparations for the nineteenth annual show in that city. New York is emblazoning on the four winds its coming exhibition. Or, rather, each are preparing for exhibitions, as the passenger car is not to have it alone this year. Lack of space prevents Chicago and New York from staging motor car and truck shows in the same buildings, so in each city trucks are to have their days immediately following those of the cars. Chicago starts with cars Jan. 5-Feb. 1 and trucks, Feb. 3-6, while New York follows closely, overlapping in fact, with cars Feb. 1-8 and

trucks, Feb. 10-15. Other shows will be of more automotive nature, with cars, trucks, motorcycles, tractors, accessories and other exhibits. Minneapolis will repeat its automotive show, which was so successful last year, and two national tractor shows have been sanctioned.

THE show list seems to be longer this year, and the enthusiasm manifest in the preliminaries seems stronger. It is as it was with Christmas just past, perhaps. The signing of the armistice has brought new life, which takes form in many ways, both big and little. It was a bigger Christmas than ever before, to most individuals and to all business concerns in any way affected by holiday shopping. The shows furnish a fresh start on automotive business. They are a little later this year, but they are going to be bigger and better this year. And they are going to bring with them bigger and better business for the dealer. Let the list of exhibitions be augmented by exhibitions in your town. Get on the band wagon.

Progress of Tractor Merchandising

THE selling of farm tractors is getting to be easier work. This is because both dealers and farmers understand the tractor better—how to work it and how to adopt it most advantageously to farming conditions. The better service the dealer is giving on tractors also is a factor of importance in making the business easier to handle, for it is inspiring the farmer with confidence in both dealer and machine.

AS a matter of fact, the merchandising of tractors has progressed far during the last twelvemonth. No small part of this advance is attributable to the entrance into the trade of the motor car dealer with his conception of both the need for, and the desired kind of, service, coupled with his equipment for rendering service.

IN short, the motor car dealer has made good in the tractor trade. He has taken to it like a duck to water. There are few exceptions to the rule that those dealers who have developed volume business on tractors during the last year have been motor car dealers. Indications are more motor car dealers will develop volume business.

MANY dealers did not get into the business early enough last year to gain an extensive and convincing experience, it is true. Those who did, however, may serve as examples of what it is possible to accomplish and their experiences may serve as a source of inspiration to the others to go and do likewise during the year to come.

THE tractor business is something to tie to. Also the motor car dealer is in the tractor business to stay. There is every reason to believe that the vast majority of the dealers who took on the tractor, even though it may have been an emergency measure in the beginning, since have come to a realization of the possibilities and now have come to the conclusion that it shall have definite and serious attention for the future.

THE best assurance that the tractor will solve satisfactorily the power and help problems of the farm is found in the progress it has made in that direction during the last year and in the further fact that its continued progress is in the hands of dealers who have been keen enough to realize the possibilities and able enough to realize on them.

Annual Show and Specification Number

MOTOR AGE for January 23 will be the big number of the year. For eighteen years the opening of the motor show season has been signalized by a special number of MOTOR AGE, which presented in one issue as nearly as possible a complete summary of the new designs of vehicles for the new season and the trend of engineering thought. This, together with the detailed specifications of mechanical features of the new vehicles, has made these numbers ones which were treasured by readers throughout the year.

This year the Annual Show Issue will be no less valuable and timely. Here are a few of the features it will offer:

The Cars of 1919—Engineering changes in the chassis and developments in body design. Effect of the war on car design.

Tendency Charts—History of growth of mechanical features graphically told.

The Car Illustrated—Photographs of all the new cars.

Short Car Descriptions—Changes in product of individual factories.

Specifications—Complete mechanical details of passenger cars, trucks, tractors and house-lighting systems in tabular form for ready reference.

Markets and Production—Possibilities of sales—possibilities of production—probable price changes.

Dealers' Prospects—As seen by representative dealers and factory sales managers.

The Show Circuit—Program of show season.
And more—

Of course, there will be the regular features which make every issue of MOTOR AGE valuable—the news of the industry, the Electrical Equipment, Readers' Clearing House, Repair Shop, Maintenance Data Sheets, and others.

The issue of January 23 will be worth getting and WORTH SAVING.

U. S. Shipped 110,911 Motor Vehicles

Only 1196 of These Were Lost Enroute to Foreign Countries

WASHINGTON, Dec. 27—The Motor Transport Corps of the United States Army shipped 110,911 vehicles, including motor trucks, passenger cars, ambulances, motorcycles, bicycles and sidecars, to the American Expeditionary Forces from the beginning of the war to Dec. 1, 1918. Of this number 1196 vehicles were lost at sea.

During the same period 15,468 tons of spare parts were shipped, of which none was lost. These figures are contained in a report just completed by the Motor Transport Corps. In all 2110 Ford, 3183 Dodge Brothers and 1420 Cadillac passenger cars were shipped, a total of 6713, of which twenty-six were lost at sea. In addition there were miscellaneous and foreign passenger cars, totalling 1191, of which twelve were sunk.

Ambulances Shipped

Ambulances shipped, including 4219 Fords, 3239 G. M. C.'s and 249 miscellaneous, totaled 7707, of which 104 were lost, leaving a total of 7603 safely landed in France. In all 46,636 trucks of all types were shipped with 361 lost at sea, making a total of 46,275 safely landed on the other side. In the number shipped were 6712 Ford light delivery trucks, 1391 Dodge Brothers light repair trucks, 11,239 class AA trucks under 1½ tons, in which class were the G. M. C. ¾-ton, Commer 1-ton, White 1-ton and Ford ¾-ton.

In the class A division 5214 trucks were shipped, of which ten were lost. This class included White 1½-ton, Garford 1½-ton, light aviation 1½-ton, Pierce 2-ton, Packard 1½-ton and White non-standardized 1½-ton types. Also, 18,986 class B types, 3 to 5-ton sizes, were shipped, including 6458 standardized class B trucks, known as the Liberty trucks. Of this number 160 were lost at sea. In addition to the standardized class B truck the class B includes heavy aviation 3-ton, Packard 3-ton, Mack 3½-ton, Riker 4-ton, Pierce Arrow 5-ton, Mack 5½-ton, White 3-ton, Packard 5-ton and White 5-ton types.

SUIT AGAINST DREXEL MEN

Chicago, Dec. 31—A suit has been filed in the superior court here by Charles E. Holm and about twenty other stockholders, seeking to enforce the liability of directors of the defunct Drexel Motor Car Corp. The bill states that the concern was adjudged bankrupt May 29, 1917, after an existence of less than a year, during which \$500,000 worth of stock is said to have been sold.

BRITISH POST-WAR CARS

London, Nov. 1—by mail—Although British manufacturers of motor cars are still far removed from quantity production of motor cars, the trend toward post-war models is becoming more marked every day and already some details of cars which before the war would have been considered nothing if not radical have been permitted to become public.

It is expected that aeronautic experience will have a profound effect on design and that lighter, more efficient cars will be the result. For example, it is stated that one manufacturer of international repute has designed a car fitted with a five-cylinder air-cooled radial engine and having a chassis which has many other departures from orthodox practice. The cylinders are set star-fashion around the crankcase.

Another maker proposes to use a tubular frame carried on transverse semi-elliptic springs front and rear.

ILLINOIS HAS 400,522 CARS

Chicago, Dec. 30—Motoring in this state has grown almost ten times in the last seven years. Licenses of owners' and dealers' cars and motorcycles up to Dec. 17 reached 404,070. Fees total \$2,663,424.03. Illinois has registered 389,690 cars this year, 10,832 motorcycles, 45,572 chauffeurs and 3548 dealers. The state treasurer now has on hand \$4,812,870.90 for good roads. This is exclusive of the \$60,000,000 bond issue.

I. H. C. CHANGES PRESIDENTS

Chicago, Dec. 27—Harold F. McCormick succeeded his brother, Cyrus H. McCormick, as president of the International Harvester Co. to-day. The new president was vice-president. No other changes are contemplated in the company's administration or affairs, it is announced.

OHIO ROAD CONGRESS

Columbus, Ohio, Dec. 27—The second annual road congress of Ohio is scheduled for Columbus Jan. 14-16. Post-war problems are to be discussed at length. The congress will be held under the auspices of the Ohio Good Roads Federation, which has the active co-operation of about a score of organization and state departments in carrying on the work of the congress.

At the same time the annual meetings of the Ohio Good Roads Federation, the Ohio Engineering Society and the County Commissioners' Association of Ohio will be held.

The headquarters will be at three hotels, the Deshler, Southern and Virginia. The sessions will be held at the Southern Hotel. The tentative program provides for many well known speakers on every phase of road building and maintenance.

DIAMOND T G. S. M. CHANGES

Chicago, Dec. 30—F. J. Pardee, for the last three years general sales manager of the Diamond T Motor Car Co., will establish headquarters in San Francisco, Cal., about Jan. 1 to represent and distribute Diamond T products in the territory west of the Rockies. Mr. Pardee will be western sales manager, and his territory will include British Columbia, Alaska and the Hawaiian Islands. A. J. Whipple, who has been acting as special representative of the company in Washington, D. C., has been appointed general sales manager.

BRUSKE BACK TO ADVERTISING

Detroit, Dec. 30—Paul Hale Bruske, after spending two years as advertising director for the Harroun Motors Corp., Wayne, Mich., has returned to the Power, Alexander & Jenkins Co., advertising agent. While during that period he gave his entire attention to the Harroun he will now continue to supervise its advertising. He also will have the supervision of the advertising campaigns of several Detroit manufacturers. During the last few months Mr. Bruske secured leave of absence to write the advertising in the campaign of James Couzens for mayor and then as editor of Aircraft Production News, the official organ of the Detroit district of the Bureau of Aircraft Production.

MOLINE SALES PERSONNEL

Moline, Ill., Dec. 28—W. L. Clark, trade manager of the Moline Plow Co., has resigned to become general sales agent for the Samson Tractor Co. and the Janesville Machinery Co., effective Jan. 1. Mr. Clarke had been with the Moline company for ten years. He is succeeded at Moline by F. S.



A glimpse at the celebrations of Americans in France Nov. 11

Patterson, formerly manager of the Southern-Moline Plow Co., Atlanta, Ga.

Moline, having decided to enlarge the tractor department, has changed the sales organization. S. C. Turkenkoph will be chief, and his assistants will be J. W. Longbon, formerly manager of the Ohio-Moline Plow Co., Columbus; J. D. Watson, formerly manager of the Kansas City-Moline Plow Co., Kansas City, and J. H. Gregory, formerly manager of the Indiana-Moline Plow Co., Indianapolis. The Southern-Moline Plow Co. territory has been divided, and a new branch house opened at New Orleans to be known as the Louisiana-Moline Plow Co., with T. S. Wadsworth as manager.

SIXTEEN-VALVE HEAD TEST

Anderson, Ind., Dec. 30—Twenty-nine and a half horsepower, as against 18 hp. with regular Ford equipment, was the result obtained with the Roof sixteen-valve head made by the Laurel Motors Corp. in a power and comparison test at the U. S. Bureau of Standards recently. The test was supervised by Captain Kopper of the U. S. War College and shows a remarkable increase of power is possible with the four-valve-per-cylinder construction. This test was made with the type B head, which is especially adapted for touring cars. Heretofore the company has confined its manufacture chiefly to type A, essentially a racing job, but later added the other for those who wanted a sixteen-valve head for average conditions.

FOREIGN DRIVERS FOR 500-MILE

Paris, Dec. 30—Special cable—Already interest is awakening in the promised revival of the 500-mile race on the Indianapolis speedway which has been set for May 31. It is stated that probably four, and perhaps more, foreign drivers will start. Those who have indicated a desire to participate are Louis Wagner and Jack Scales, who probably will drive Fiats, and Chassagne and Christians, who likely will hold the wheels of British Sunbeam cars.

ENTRY FOR INDIANAPOLIS

Indianapolis, Ind., Dec. 28—The first entry for the 500-mile Liberty sweepstakes race to be run here May 31 arrived this week. R. C. Durant, president of the Chevrolet Motor Co. of California, entered a Chevrolet special. Durant is an ardent racing fan. He has been a visitor to every 500-mile race and at one time acted as relief driver for Barney Oldfield when that veteran endeavored to win the last 500-mile with a Delage.

Iowa to Fight for Good Roads Laws

Would Issue Bonds to Create Statewide System of Highways

DES MOINES, Iowa, Dec. 27—That the coming session of the Iowa legislature, which opens in January will see the most determined fight for good roads in Iowa the state has ever known is now an assured fact. The most elaborate good roads plan ever proposed in Iowa has been mapped out by Representative Nebiker of Burlington.

Mr. Nebiker has already completed the draft of a bill which will be introduced early in the session which would do away with the present state highway commission and create a state highway department with headquarters in Des Moines. Present headquarters of the state commission are at Ames, the seat of the state college. The department would be headed by a commission of three men appointed by the governor and with powers far outreaching those of the present commission. In addition there would be a highway engineer and an assistant highway engineer with salaries of \$4,000 to \$2,500 a year respectively. Salaries of the three commissioners are fixed at \$3,500 a year.

Besides supervision of county road work, reviewing of contracts and such similar work as is done by the present commission the department proposed would have charge of financing, letting contracts and supervision of construction of a complete system of hard surfaced roads.

Mr. Nebiker's bills proposed to create a statewide system of seventeen roads, to be constructed of "durable, hard-surfaced materials." To finance this big scheme Mr. Nebiker would issue state bonds to the amount of \$50,000,000 to draw from 3.5 to 4.4 per cent interest and to be issued for twenty years. Direct taxation and use of the motor vehicle license fees are proposed to take care of the interest and principal at maturity. Definite routes for the seventeen roads are listed in the bill.

The road fight during the last three sessions of the legislature has been the most important feature of the sessions, and the measures proposed by Mr. Nebiker are bound to be fought by the opponents of good roads, it is said.

SPEEDWAY HOSPITAL REJECTED

Chicago, Dec. 30—Chicago's speedway is dismantled, and it looks as if it had been so dismantled all to no purpose. For Sec-

retary of War Baker has declared definitely that the hospital on the site of the speedway is not needed as an emergency army hospital.

Sept. 17 it was announced that twenty-eight buildings would be built on the track, to be used as an emergency hospital. The main building was to be 2040 ft. long and to contain 2500 beds. Oct. 3 it was announced from the War Department that the site had been rejected on the ground that the building was not essential. Despite this, however, the work of erecting the hospital has gone ahead, accompanied by hints of bribery, accusations and counter accusations. As matters now stand, Chicago has no speedway; in its place rises an immense hospital which will be considered, Secretary Baker says, if a permanent army hospital is located in the vicinity of Chicago, though this would require action by Congress.

TO SELL MONROE PLANT

Pontiac, Mich., Dec. 28—The plant of the defunct Monroe Motor Co. will be sold on the premises Saturday, Jan. 25, 1919, by the receiver, Robert T. Armstrong. The factory contains 100,000 sq. ft. of floor space.

BUICKS COST LESS

Flint, Mich., Dec. 31—Special telegram—Effective Jan. 1, Buick prices are:

MODEL	NEW PRICE	OLD PRICE
3-pass. roadster	\$1,495	\$1,595
5-pass. touring	1,495	1,595
7-pass. touring	1,785	1,885
4-pass. coupe	1,985	2,085

No change is made in the prices of other models.

FORD PARTS FOR ALL GARAGES

Detroit, Dec. 27—After Jan. 1 any garage can handle Ford parts and secure the regular dealers' discount on same. The Ford Motor Co. has been trying this method out in a limited way and has found it successful and intends to make it a plan of national scope starting on Jan. 1. This will not only increase the distribution of the Ford parts but will also in a broad way militate against the many so-called fake parts which have been flooding the market.

This is only another step to broaden the Ford policy to such a degree as to make the car and its parts almost a matter of general merchandising. The removal of territorial restrictions on Ford sales last year was the first step in this direction. With every garage certain of its ability to secure genuine Ford parts at the regular dealers' discount, the attraction of handling parts for Ford cars made up by other concerns largely will disappear. This will also be a factor in increasing the ability to obtain service on the car since repairmen need not be delayed in securing parts, as they will be able now to carry them in stock.

How Reader Uses Motor Age

PORT ARTHUR, Ontario—Editor MOTOR AGE—We are interested in your item from "A Reader," as to how he uses MOTOR AGE.

We have a scheme in our office which we find very useful. We have a large index, and every item of interest to the shop or the office is noted in the index, the article, with the number and date of the magazine is dotted down, and when we wish to refer to it all we have to do is turn up the index and we can immediately put our hand on the article, though it may be a year ago.

It has proved of very great service to us and we pass it on to you for your consideration.—Orpheum Auto Garage.

Other Details of Liberty Engine

Fuel Consumption Over 20 G. P. H.—2500
Parts to Tool Up—Cost Per Horsepower

WASHINGTON, Dec. 27—A Liberty airplane engine averages between 20 and 25 gal. of gasoline consumption an hour, depending upon the altitude, speed used, etc. The original program for airplanes standing at the time war was declared called for 332 planes. This was shortly afterward increased to 1000 planes and then three weeks after the declaration of war, and following the receipt of information from abroad, the program was increased to 22,000 planes and was immediately approved by the Secretary of War. This information was brought out by Lieut. H. H. Emmons, U. S. N., here recently.

Difficulties of Manufacture

In describing the difficulties encountered in the production of the Liberty engine he said that from 2500 to 3000 jigs, tools, etc., had to be designed and manufactured especially for each manufacturer engaged in Liberty engine production, and from 80 to 85 per cent of those first made were found to be useless either through poor work or pro-German influence. He stated that Maj. J. G. Heaslett, formerly of the Studebaker Corp. and during the war in complete charge of inspection, production and engineering at Detroit, was the man who was directly responsible for the large production of airplane engines which resulted up to the signing of the armistice.

Major Heaslett, he said, working with a committee composed of H. M. Leland, Lincoln Motors Co.; C. H. Wills, Ford Motor Co., and Messrs. Bell and Roberts of the Packard Motor Co., had full charge and complete authority for all engine production, and it was the work of this committee and of Major Heaslett that production amounted to 31,814 engines up to Nov. 11.

The Liberty engine, said Lieutenant Emmons, is rated at 410 hp. but often reaches 475 hp. and in several instances under special conditions, has been developed to produce 526 hp. Its life at the front is estimated at sixty days. Airplane mechanics are instructed to overhaul at least once every 50 hr. as compared with an overhaul every 20 hr. with other airplane engines. The highest endurance record made by an airplane equipped with a Liberty engine was 162 hr. in the air.

Twenty Dollars a Horsepower

In discussing the costs, Lieutenant Emmons stated that the foreign nations figure the cost of an engine at \$20 a horsepower. This would have placed the cost of the Liberty engine at more than \$8,000 and was immediately regarded as too high by the American officials who first set a bogey price of \$5,500 and later reduced this to \$4,000 after the manufacture showed it to be about the proper price. The Wright-Martin Co., it was stated, received \$5,500 apiece for several thousand Hispano-Suiza engines it produced, this high figure being due to the royalties which had to be paid to Spain as that country controls the

Hispano-Suiza patents. The king of Spain, it was said, is the actual owner.

Discussing foreign engines and the American manufacturers' difficulties with them, Lieutenant Emmons said that when the specifications and drawings of the LeRhône engines were received they were almost unintelligible. They called, for example, for the use of mild steel when they should have specified chrome nickel, and the American authorities found it necessary to tear down an engine and analyze it to learn what metals were used in its manufacture before it was possible to make it. There were 2500 LeRhône engines ordered, of which 1500 were delivered up to the signing of the armistice. These were made by the Union Switch & Signal Co. and were praised by the foreign chief engineer of the LeRhône factory abroad to be the best rotary engines he had ever seen.

The mission sent abroad by our authorities early in the war recommended the use of the Bugatti airplane engine in our planes and insisted upon its use from overseas, partly because they did not know all about the Liberty engine and also because they thought that the Bugatti might prove to be a very satisfactory machine. The Bugatti engine sent to this country as a sample had never made over a 35-hr. test.

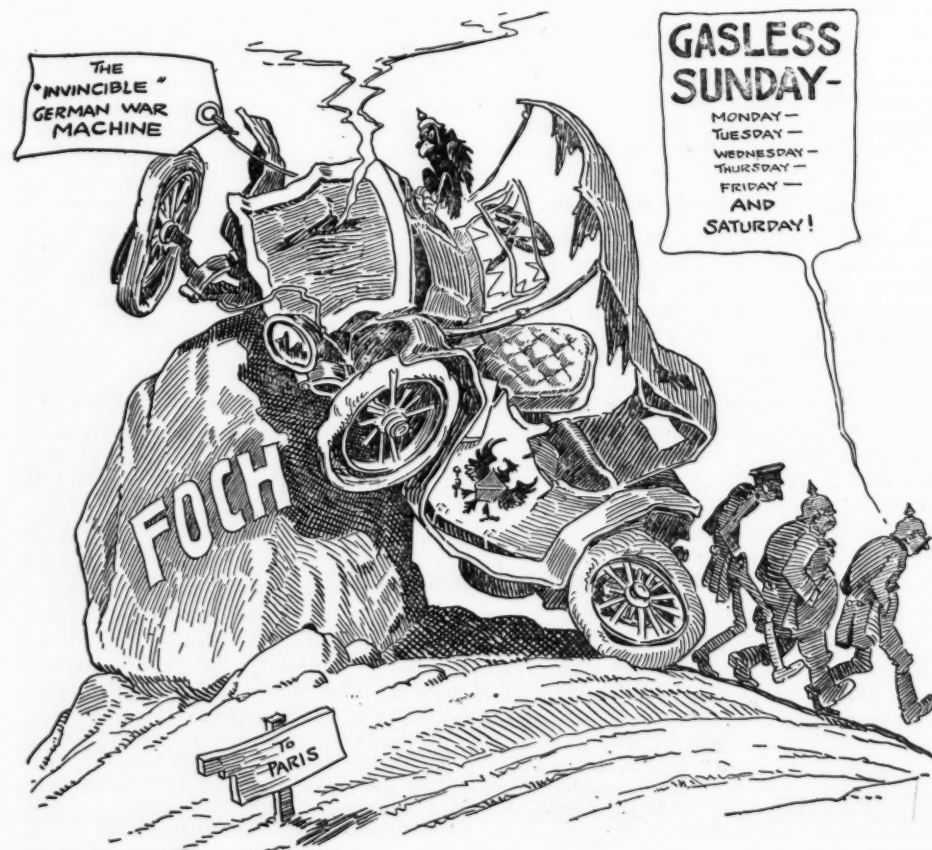
It had suffered an accident in France and arrived in this country with a bent crankshaft. The American authorities, after straightening the shaft, found it necessary to redesign the engine before going into manufacture on it.

In discussing airplanes it was said that the De Havilland 4 was the only combat plane on which this country had reached quantity production. A hundred sets of parts for the Handley-Page plane had been completed and shipped abroad. These were shipped in part sets because of the size of the planes and the consequent advisability of assembling them abroad. We were just entering into production on the USD9A, which is a substitute for the British DH9. Three thousand Le Pere airplanes had been ordered from the Fisher Body Co. and Packard Motor Car Co., of which twenty-five were completed.

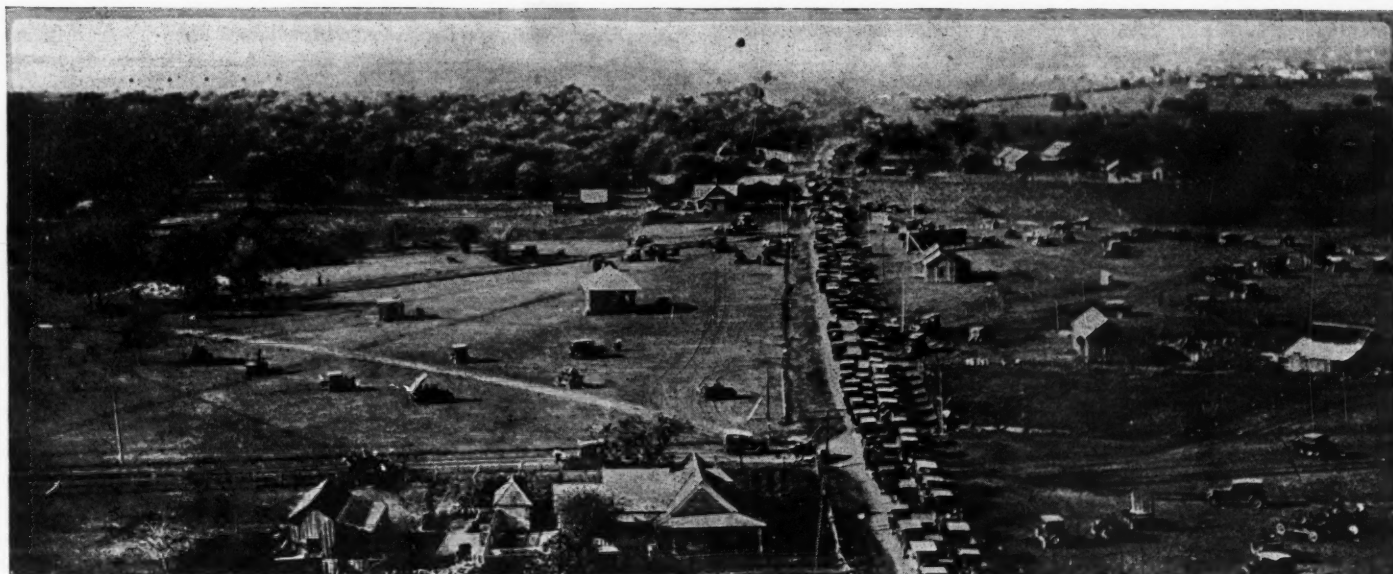
MORE WORK FOR ENGINEERS

Chicago, Dec. 30—That there is a greatly expanded field for usefulness for the American Society of Agricultural Engineers following the war was the opinion expressed by Daniel Scoates of the Mississippi Agricultural College, president of the society in presenting his annual address at the twelfth annual convention, which is

The Greatest Detour in History



—The Ohio Motorist.



A mile of cars enroute to the flying frolic at Love Field, Texas, typifies modern travel

in session this week at the Hotel Sherman.

During the coming year the society will begin seriously the compilation of an agricultural handbook, the lack of which has been felt for a long time. Also the employment of a permanent secretary will be considered in order that the work of the society shall have greater continuity. During the last year the membership of the society has been increased by fifty, a fact which was reflected in the attendance at the opening meeting of this year's convention, which was larger than ever before in the history of the organization.

The program for Monday forenoon was devoted principally to a consideration of the plow bottom. The manufacturer's side of the problem was presented by C. A. Bacon of the Oliver Chilled Plow Works, South Bend, Ind., while the theoretical side was presented by E. A. White, professor of farm mechanics, Illinois State University.

The problem of plow manufacture has been complicated by the advent of the tractor with its greater power and speed, and it is the province of theoretical and practical men to get together to meet the conditions which power farming methods and equipment have precipitated.

Monday afternoon was devoted to questions of farm structure, supplementary sources of farm power and farm mechanical problems. Tuesday's program includes papers on farm operative equipment, the advantages which will come to the farmer through the development of the rural motor express and a discussion of the engineering problems involved in farm lighting.

Officers of the society for the ensuing year were elected as follows: President, Raymond Olney, editor Power Farming, St. Joseph, Mich.; first vice-president, L. F. Seaton, University of Nebraska, Lincoln, Neb.; second vice-president, H. E. Murdock, Montana Agricultural College, Bozeman, Mont.; secretary-treasurer, F. W. Ives, Ohio State University.

PACIFIC PLANES REACH ATLANTIC

Washington, Dec. 27—The squadron of four Army training planes flying from San Diego, Cal., has reached the

Atlantic coast. This flight in formation approximates 2400 miles. The planes left the Pacific coast Dec. 4, and they have come east across the continent in short flights limited by the size of their gasoline tanks, none of the planes carrying more than 1½ hr. supply at any one time.

The crews, two men to a plane, have gathered data and statistics on landing fields and made air maps of the route along which they came. This work is a part of the big reconnaissance now being made by flyers going out into all directions from over twenty-five fields in various parts of the country. The material collected, as fast as it is returned to the fields, is being forwarded to Washington for analysis and compiling in the form of a Government air guide or blue book. Maj. Albert D. Smith, commanding the air squadron which has come east from the Pacific, reported to the Division of Military Aeronautics in Washington, D. C., that his planes left Americus, Ga., at 9:00 a. m. Dec. 22 and arrived at Jacksonville, Fla., at noon, having encountered rain and fog all the way and at no time having a ceiling of more than 500 ft. Major Smith expects to fly his squadron to Washington at an early date.

FUTURE AIR SERVICE

Washington, Dec. 27—Reports and rumors are numerous here with regard to the future Air Service of the Army. While nothing definite can be said at this time, as the plans of the War Department are kept secret until they will be presented to Congress, current statements are to the effect that the future Air Service will be composed of approximately 500 officers and 5000 enlisted men. This would mean about 350 flyers and at the most the maintenance of a fleet of 1000 airplanes. It is said that present plans are for an Army of 400,000 men, and if the Air Service in the future is to be proportionate to that maintained with our Army of 2,000,000 men, which was 20 per cent, the figure stated above would be slightly below the requirements.

It appeared that although the War De-

partment is making its plans for presentation to Congress, these plans hinge on the outcome of the peace conference and the league of nations, for it is expected that armament may be regulated in size to conform with the requirements of the platform which will be formed as a result of the league of nations, if one is organized.

EAGLES ARE FOUND FIT

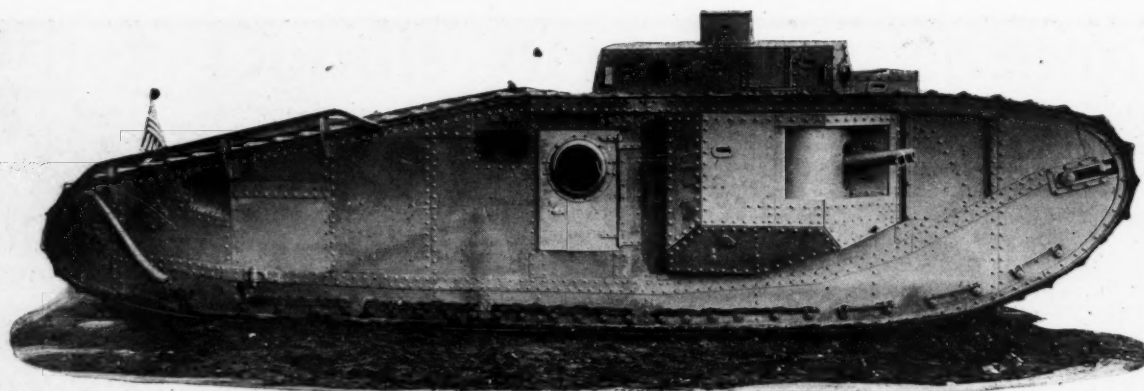
Washington, Dec. 28—Trials of the Eagle boats have convinced Navy constructors that the little craft turned out by the Ford plant at Detroit to fight submarines are worthy of taking their place as permanent units of the fleet. It was learned yesterday that official reports to the Navy Department giving full details of the trials show that in speed, seaworthiness and maneuvering ability the new boats exceed all contract requirements.

An average sustained speed of 18.3 knots was made by the boat used in the tests. The vessel showed no signs of "buckling" when the speed was forced still higher for short periods.

Three Eagles recently sent through the Welland canal into the Atlantic arrived at their destination on the coast after passing through two gales of unusual severity. The crews reported the boats had been more comfortable than certain types of destroyers and the hulls had not strained at any point. Most of the Eagles completed under the war contract will be utilized as gunboats.

CHICAGO AIR MAIL POSTPONED

Washington, Dec. 27—The Postoffice Department has suspended the operation of the New York-Cleveland-Chicago air mail route until Jan. 2. Airplanes in the service will be taken apart and reassembled to insure better success when the next attempts are made. The Postoffice Department states that the airplanes used in the experiments which resulted in failure last week were assembled hastily and that this caused the mishaps.



Side view of Mark VIII tank, which was built partly by British and partly by American factories

Mark VIII Tank a 35-Tonner

Liberty Engine Used in Huge Model That Carries Eleven Men

It is very possible that one of the reasons why Germany called off the war and signed the armistice is that she had heard of the new tank. The cessation of hostilities prevented an invasion of Germany by the greatest tanks ever conceived. These tanks did not exist only in the minds of inventors, but one of them was actually built and tested out, experimentally, at Bridgeport, Conn. This tank, known to the War Department as the 35-ton Mark VIII, was built partly by British and partly by American factories and was to have been assembled in France. It is an improvement on the large type of British tanks, known as Mark V, which General Byng used successfully in his surprise attack at Cambrai. They are far more powerful, however, and anyone seeing their awe-inspiring bulk climbing like huge prehistoric monsters over rocks, stone piles, trenches and through forests, brushing 18-in. trees aside or crushing them beneath their bulk, readily can understand why Germany saw that it was all useless.

34 Ft. Long

The 35-ton tank is 34 ft. 2½ in. overall in length and 12 ft. wide. It is built more like a war vessel than a land vehicle. It contains a crew of eleven men and carries an armament of seven machine guns and two 6-tonners. The tank has a speed of

5.2 m.p.h. and can turn in a 40-ft. circle.

Like the previous tanks, it is built with a track-laying type of tread in which propulsion is secured by moving the track around the vehicle, so as to provide continuous rail surface for the rollers upon which the tank is carried.

The Liberty engine, renowned for its success in aerial warfare, would have added new laurels by its success in tank warfare had the plans for this machine proceeded to their realization. The powerplant was a modified Liberty engine, practically the same as the Liberty aircraft engine except that cast-iron cylinders are employed instead of the drawn steel. As a matter of fact, the experimental tank has the drawn-steel cylinder and has proved itself to be a success under the critical eye of the war and navy department officials of both this country and Great Britain.

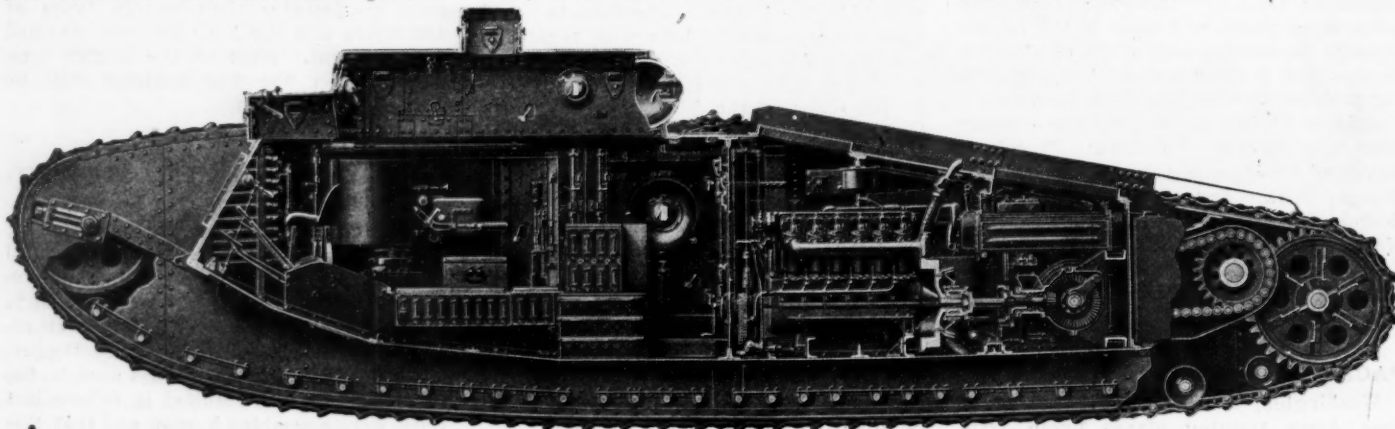
Loaded for action, the 35-ton tank weighs nearly 40 tons. Its construction differs materially from any other tanks in that it is not built upon a chassis with a body attached but is built like the hull of a war vessel. The hull not only forms the carrying space for the crew and propulsion units but also acts as the structure of the machine. A plan view of the immense hull is like a large letter H, with a very heavy cross bar on the letter. The two

tracks pass around the outside of the H-shaped hull, being driven from the engine through a large compound clutch which has both a frictional and a positive engagement, then through a compound planetary transmission, providing two forward speeds and two reverse speeds, which delivers its drive by a chain sprocket and roller pinion to the road track driving wheel.

The engine and driving members, including the clutch, the epicyclic, or planetary, transmission and the chain drive are located in the rear of the hull. The engine, together with the clutch and epicyclic gearing and other necessary engine parts, occupy the engine room, which is 9 ft. 9 in. long.

Fighting Room

In front of the engine room is the fighting and operating room, at the forward end of which is the driver's seat, with the control levers. On either side of the fighting compartment is a sponson, or projecting swinging structure carrying a 6-pounder gun. The sponsons carry revolving gun mountings capable of giving a wide radius of fire with the 6-pounder guns. In addition, the sponsons themselves may be swung back into the interior of the fighting compartment to reduce the width of the machine to permit it to be loaded on a standard railway car.



Transverse section through Mark VIII tank, showing the internal structure and location of parts

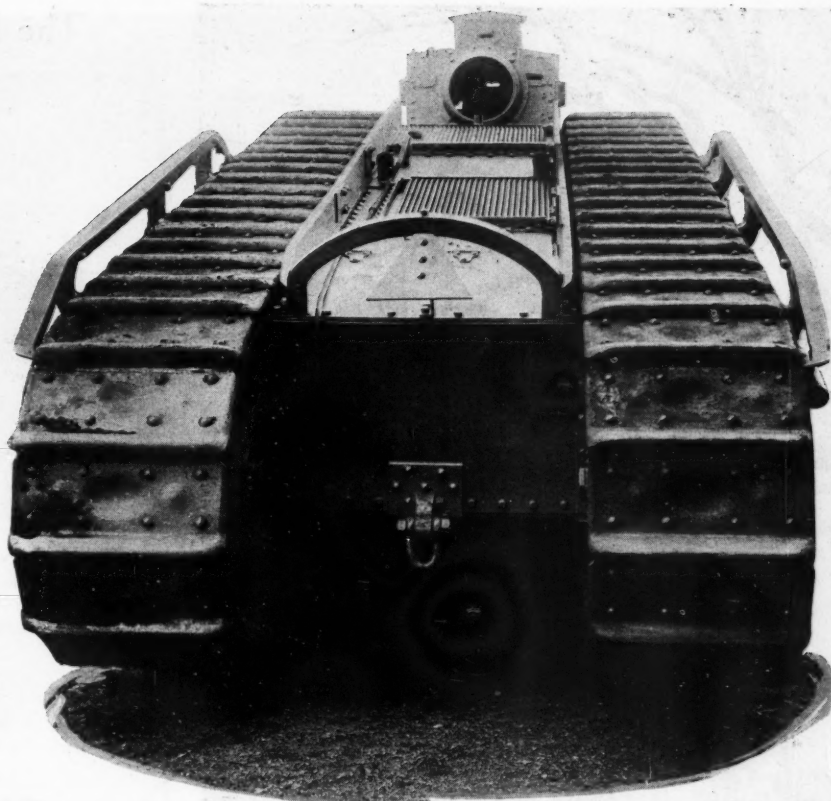
Above the fighting compartment is the main turret, which carries five machine guns. Above the main turret is the directing officer's coning tower, from which it is possible to obtain vision on all sides of the machine and from which its movements may be directed. Located in the fighting compartment are sufficient ammunition storage provisions for both 6-pounder and machine guns. Entrance to the fighting compartment is secured through a door on either side and in the doors also are mounted machine guns. This gives a total of seven machine guns, five being in the main turret and two in the doors; and two 6-pounders, one located in each sponson. The fighting compartment is separated from the engine room by a bulkhead in which are sliding doors.

The exterior portion of the hull is elongated on each side to provide a guide for the track. The rear extremity contains the chain housing for the chain drive and the track driving sprocket and the forward extremity carries the track adjusting wheel which can be moved forward or backward to tighten or loosen the track chain.

How Steering Is Handled

Steering is accomplished by allowing the track on one side to move at a faster rate than the track on the other side, which tends to swing the machine in the direction of the slow-moving track. If one track is locked and the other track is moving ahead, the machine will be turned in the narrowest possible radius. The radius in which the machine can be turned depends to a large extent upon the nature of the ground, as, owing to its weight, it will dig up the ground to the side as it is being turned, which will impede the rate at which it can be swung around and sometimes will necessitate a wider turning arc.

Control of the engine, clutch, epicyclic gear, reduction, steering, etc., all are taken care of from the driver's seat, which is located in the forward end of the hull. The driver's seat is of such a height that the driver's head is within a box-like structure at the front end of the main turret. Slits are cut in this compartment, which allow the driver to look either side or ahead. The slits can be closed by rotating protecting shields when under fire, and when not under fire the driver can raise a hinged door at the front of the turret, allowing



Rear view of Mark VIII tank. Loaded for action, this tank weighs 40 tons

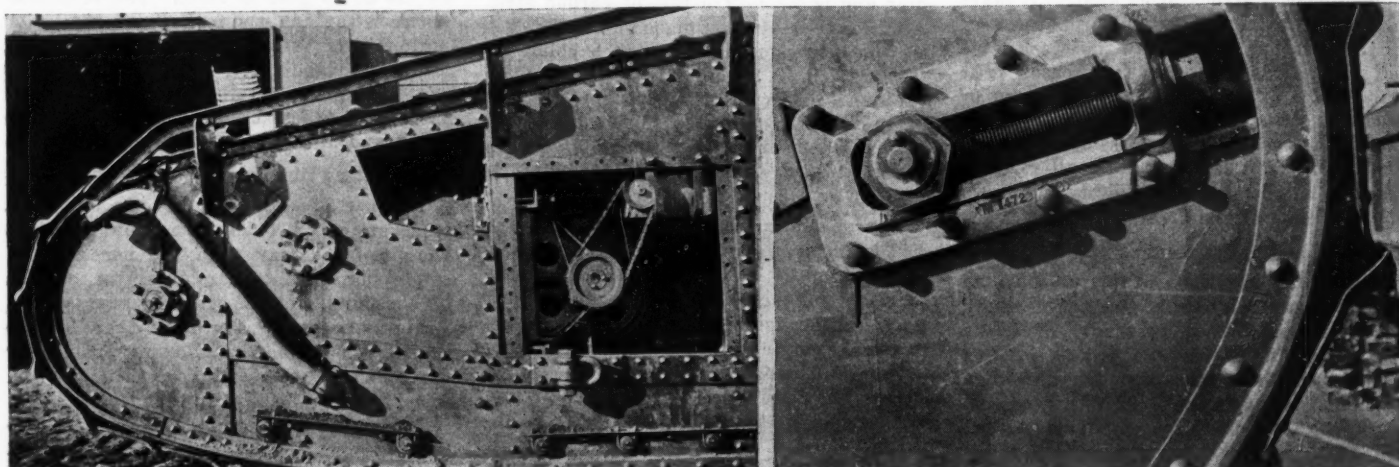
a clear and unobstructed view ahead of the machine.

Outside of the spark and throttle connections and other engine controls, the driver has four levers and a pedal. The two inside levers are for shifting gears and control the epicyclic transmission. The left outside lever controls the clutch, and the right outside lever is for reversing the pedal, which is in the center of the track brake. When either shifting lever is in neutral, the track brake on that side can be applied so that shifting both levers to neutral permits applying track brake to both tracks.

The gasoline supply is carried in three tanks, of 80-gal. capacity each, mounted near the rear of the machine, just below the top plating. The tanks are similar and

mounted side by side. The gasoline is forced by pressure from these three tanks to a gravity tank directly above the engine, from which the flow is by gravity and pressure to the two carbureters. Pressure is supplied by the engine-driven air pump, the pump being a four-cylinder design, operated by the camshaft. The gasoline tanks are placed to the rear of the engine room and separated from it by the bulkhead.

The air pump is mounted just above the clutch and is driven by a belt on the pulley on the engine shaft brake. The pulley on the air pump operates the camshaft, which works directly against the pistons or plungers of the pump. Before the engine is in motion, a sufficient pressure can be secured to start the flow of fuel by a hand pump on the bulkhead between the engine room and

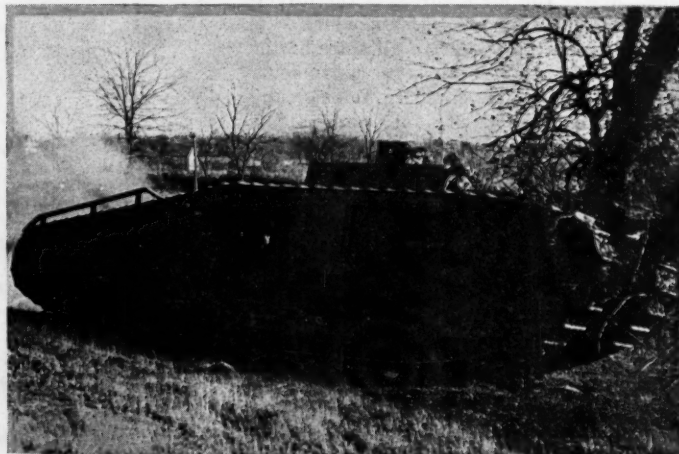


Rear view of Mark VIII tank, left, showing the exhaust pipe and the cover plate removed, exposing the epicyclic transmission and mechanical oiler. The track-adjustment feature of the tank is shown at the right. This pulls the track tighter

Handwritten notes at the bottom of the page:

7 80-gal. tanks = 240 gal. (90-gal. each) 180
300
100

The Mark VIII Tank in Action



The Mark VIII in action—crossing a stone wall, at left, and crushing an 18-in. tree to the earth, above



When the tank is swung around it digs up the ground in the manner shown above

fighting compartment. The flow is received from one of these three tanks, depending upon which one of the cocks is open to the gravity tank, above the engine.

The hull of the tank is composed of armor plate of various thickness, ranging from $\frac{1}{4}$ in. to a little more than $\frac{1}{2}$ in. This armor plate, which is 0.6 in. thick in practically all exposed parts of the hull, is capable of withstanding direct heat from machine guns or rifles and will turn heavier ammunition if struck at an angle. It takes a direct hit from a fairly large piece of artillery to put a tank like the Mark VIII out of commission. For this reason it is impervious to the fire of infantry men or machine gunners. In working out the details to move this heavy mass of metal and make it readily handled under all sorts of traction conditions, some highly ingenious engineering was required.

Two Clutch Engagements

Inasmuch as the complete machine weighs approximately 40 tons, the clutch has been designed to gradually overcome the inertia of the heavy mass and, for this reason provides first a slipping and then a positive engagement. The slipping engagement is secured by an asbestos-faced cone clutch, which first comes into play due to the frictional contact between the leather facing and the cone shaped flywheel. The positive engagement of the clutch is

secured by the splines, or teeth, or the clutch sleeve, which in turn mesh with corresponding splines, or teeth, on the end of the crankshaft.

The function of the cone clutch part of the compound clutch is simply to start rotating the transmission drums. After the friction part of the clutch has accomplished this the positive drive part then is engaged. The driving clutch unit is bolted to the flywheel members of the engine and is a cone frustum of carbon steel. Additional pressure is placed upon the cone by the movement of the clutch collar by the large clutch spring, which is concentric upon the clutch shaft. This spring is $5\frac{1}{2}$ in. in diameter and has a coil length of $4\frac{1}{4}$ in. Engagement between the clutch sliding collar, or sleeve, and the cardan shaft is secured by a coupling of nickel steel.

The epicyclic gearset has two forward speeds and two reverse speeds. It is mounted transversely across the machine in the rear end of the engine compartment. It provides the necessary gear reduction between the engine drive and the track propulsion units and also carries the drive outward on both sides from the center line of the machine to the exterior track mechanism.

The drive enters the epicyclic gearset by a bevel pinion drive over the engine and clutch and leaves it in the form of a gen-

eral drive to the track propulsion gearing. The gears are shifted in relation to one another by a shifter fork mechanism, which takes care of the forward and reverse movements, and in addition to this the high- and low-speed ratio are secured by brakes which act on drums, governing the ratio of the planetary trains contained in the epicyclic gearbox.

The reductions in the box are 5 to 1 on low and 1.285 to 1 on high. The reduction at the bevel gear is 14.46. The reduction between the chain sprocket and the roller pinion is 12 to 23 and between the roller pinion and the track driving wheel, 9 to 37. This gives a total reduction between the engine and track of 32,545 to 1 on high speed and 126.64 to 1 on low speed.

Gearshifting Simple

The use of the planetary, or epicyclic, type of gearbox on a machine of this weight does away with the necessity of employing shifting gears except in the case of changing from forward to reverse. It is highly necessary, therefore, that the precautions mentioned on allowing all moving parts to come to rest before shifting from forward to reverse be observed.

The drive from the engine enters the epicyclic gearset by a bevel pinion and passes to either bevel wheel, depending on whether it is desired to run the machine backward or forward. Facing toward the

front of the machine, the left bevel wheel provides a reverse motion, and the right bevel wheel gives ahead motion. Engagement between the required bevel wheel and the shift is secured by a dog clutch, which slides on the splines of the bevel and epicyclic cross shaft. Both bevel wheels are in constant mesh with the bevel pinion, but only one is the driving engagement, due to the position of the clutch; the other is simply an idler, and has no part in the driving.

From the bevel wheel, in engagement with the dog clutch, the drive passes to the cross shaft, thence to the sun pinion, mounted at the opposite extremity of the cross shaft, from the bevel wheels. The sun pinion meshes with the large planet pinion, and this in turn meshes with the annular ring gear, secured to the gear casing. This casing carries with it the low-speed brake, the same bolt passing through the annular ring and the two halves of the epicyclic casing.

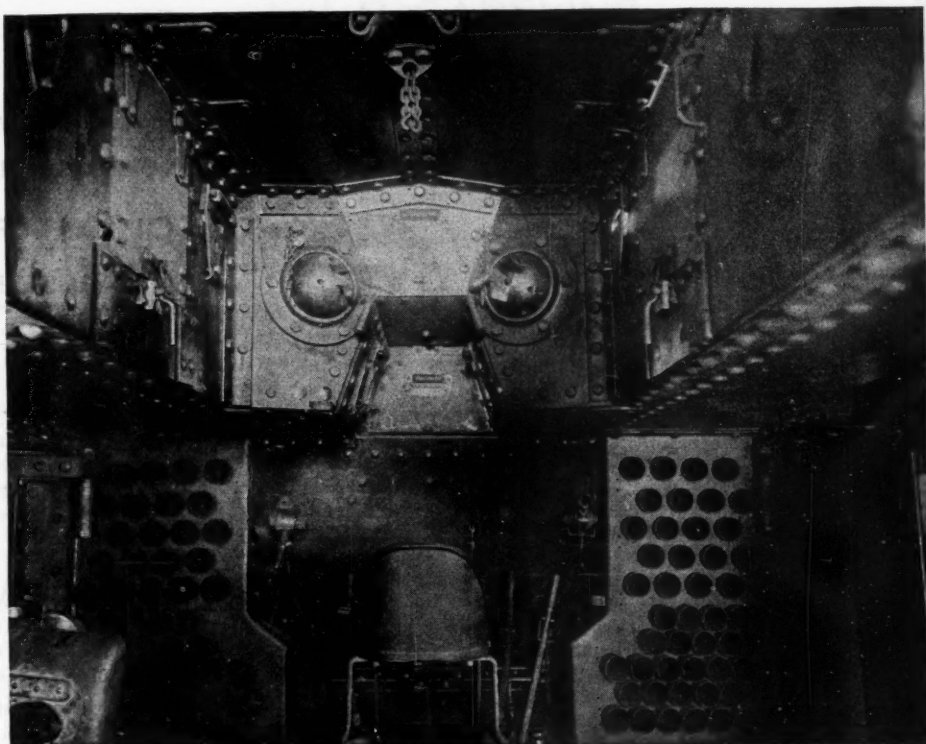
The casing also carries the drive back to the chain drive sprocket, when it is not restrained in doing so by the application of the brake mounted upon it. The epicyclic gear casing also carries a pin, upon which is mounted the small epicyclic planet pinion, which meshes with a small epicyclic spur ring, carried on an epicyclic spur disk, which in turn is splined to the epicyclic cross shaft. Revolving with the face which carries the spindle for the small epicyclic pinion is the high-speed brake, which acts as part of the gear-changing mechanism.

The drive is taken from the epicyclic gear and transmitted to the track by a driving chain. The driving sprocket is mounted on the epicyclic cross shaft and takes the drive directly from the epicyclic gear. From this point it passes to the roller pinion which has the sprocket wheel at its center and the roller pinion drive on each side of the center. These roller pinions mesh in turn with the road track driving wheel which engages directly with the track; so that the progress of the drive is from the epicyclic gears through the driving sprocket; then by chain to the sprocket on the roller pinion, and from the roller pinion to the road track driving wheel which is driven by the rollers on the roller pinion. This drives in turn the track.

Road Track Continuous

The road track passes in the form of a continuous belt running around the entire exterior of the hull. There are fifty-eight rollers, which carry the weight of the machine. These are known as lower rollers, as distinguished from the top road track rollers, of which there are two. Of the fifty-eight rollers, twenty-eight are fitted with spring plates which act as spacers, and thirty are plain without the spring plates. Since the road track is double, these spacers keep the rollers which roll upon the track at the proper distance apart. The two top road track rollers are alike, one on each side at the point where the track makes its sharpest angle and where, consequently, the greatest strains may be expected. Elsewhere along the top the track slides on the top track rails.

The track links are drop-forged steel, having a length from pin center to pin center of 11.154 in. The assembly of these links must be very accurate, and the allowable



Here are the driver's seat and the control arrangement inside the Mark VIII, showing ammunition storage facilities

limit in assembly is 0.004 in. between pin centers, that is, when links are assembled in pairs they must agree to within 0.004 in. between pin centers. The links perform the double duty of binding the chain together, and also of forming a rail surface upon which the machine rolls. It takes a left and right link bar to make up one link assembly. These bars are connected by the pins, which are driven through. The pins are surrounded by carbon steel bushings, which take the wearing stresses, due to meshing with the road track driving wheel. Riveted to the links are the track shoes, which are in contact with the ground. The track shoes are pressed from armor plate, and so shaped that they link one over the other. The track shoe is 26½ in. wide. Under normal conditions there is a total area of 41.052 sq. ft. of track surface in contact with the ground.

The entire control is operated from the driver's seat at the forward end of the hull proper. The driver's seat and the forward control unit, including the necessary levers, shafts and linkage, are made up as a single assembly. The driver has a pedal and four levers to operate, exclusive of the spark and throttle levers. The pedal is the brake. The inner left lever is a speed control for the left track, and the inner right lever is the speed control for the right track. The outer left lever is the clutch and the outer right lever the reverse.

The change speed levers are similar for the left and right tracks. The lever engages in two quadrant jaws, the outside taking care of high speed and the inside taking care of low speed. When the lever is engaged with the high- or low-speed jaw of the quadrant and pulled back, the speed is engaged.

The equipment of the 35-ton tank is as complete as would be expected in a land battleship of this size. It even goes so far

as to provide a pigeon basket containing three pigeons to release in case the tank should be cut off from its base. There is a lunch kit in a vacuum arrangement which keeps the food hot for 24 hr.

U. S. CARS IN THE EAST

Washington, Dec. 27—While American cars predominate in China, the future market for motor vehicles in that country depends upon road construction. A report just issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, says that as a general rule there are no suitable roads to be found outside the foreign concessions of the treaty ports, although there are some 150 miles of streets in Peking suitable for motor cars and a few short stretches of road scattered throughout the republic. The feature that should interest American motor car distributors, however, is the fact that there is at the present time a desire for roads and a realization on the part of both Chinese officials and foreign residents that highways are essential to the development of the vast resources of the country.

There are only 2700 cars in all Japan, but the recent prosperity has greatly stimulated the demand and for some time will result in increased sales. Americans have had most of the business since the war started and seem to have the market for medium and low-priced cars well in hand.

According to Tom O. Jones, author of the Government's report, Hawaii has purchased more cars than China and Japan combined and the prosperity of this American possession makes it an attractive if limited field for the sale of American machines. An interesting feature is the fact that the sugar companies have found it economical to haul the workmen to and from the plantations in motor trucks.

Automotive Dealer on the Job

Letterheads That Typify New Spirit of Wholesale and Retail Industry

THE automotive dealer has arrived. Both in a wholesale and in a retail way he is taking his place among the distinctive business men of his community. Furthermore, the letterheads he uses gives evidence that he himself recognizes the distinction which needs to be drawn between what his business is to-day and what it was originally. For the automotive dealer is the product of evolution.

Pedigrees May Differ

He may have started as a dealer in motor cars. He may trace his origin back to the implement business. Regardless of his pedigree, however, he takes his place eventually among the latest of the merchants to receive recognition from the public as occupying a definite and important place in the business organization of the community. The automotive dealer meets a need which has come about through the development of the motor car in one direction and the development of the tractor in another, this and the tendency now manifest to substitute power methods on the farm for the old horse methods. As a matter of fact the automotive dealer caters directly to the up-to-date, scientific farmer.

During the last few years there has been no little discussion as to whether a dealer of a new and distinct type would or would not evolve. Naturally, the old order has been insistent that there was no place for the new, that the needs of the situation could and would be adequately taken care of by the distributive factors already in existence. Some still persist in this opinion and refuse to see in the rapidly growing number of automotive dealers anything which represents a trend.

Facts are against disbelief, however. The dealer who used to pride himself upon his exclusiveness and who proclaimed on his letterhead that he sold only farm implements and vehicles, to-day has substituted the motor car for the vehicles and has added trucks and tractors. Similarly the dealer who once sold motor cars exclusively now advertises the fact that he, too, has added trucks and tractors and also calls attention to the fact in many instances that he has taken on farm implements as well.

New Type of Dealers

These dealers are, characteristic of the new type, now coming to be known as automotive dealers. It is significant, too, that, as a rule, they are representative of the highest grade of retail business man. It is the active, progressive, energetic, far-sighted business man who gets out of the rut of what has been and gets into line with what is and what will be. The very fact that he has the energy and the adaptability to align himself with the new conditions which have replaced the old is the very best evidence that he is a man of ability and capacity and proclaims his right to be set apart from the general run of dealers.



THE OHIO HAPPY FARMER TRACTOR CO.

DISTRIBUTORS
LA CROSSE HAPPY FARMER TRACTORS
LA CROSSE HAPPY FARMER TRACTOR PLOWS, DRILLS AND DISC HARROWS

OFFICE, SALESROOM AND PARTS DEPARTMENT
1101-1103-1105 EAST WARREN ST.

BUCYRUS, OHIO Oct. 12, 1918.

THE Ohio Happy Farmer Tractor Co. has decided opinions on the matter of tractor service, as becomes an automotive dealer and says, "We have concluded the proper way to handle the service question is to give the farmers thorough instruction at the time the machine is delivered and afterward to charge him for all service rendered not due to faulty material or faulty construction."

C. J. DUTTON AUTOMOTIVE CO.

DISTRIBUTORS OF
AUTOMOBILES-TRUCKS-TRACTORS
2056-58 FARNAM STREET

PHONE DOUGLAS 6187

OMAHA

"A LETTERHEAD which would indicate unequivocally the character and scope of our business was necessary," says C. L. Dutton of the C. L. Dutton Automotive Co., Omaha, Neb. "The old name of the company was misleading inasmuch as it implied that we sold motor cars only. The new name brings out the fact that we sell all kinds of automotive equipment and lets people know we are abreast of the times."

AUTOMOBILES

FEEDERS

K. O. LEE & SON

JOBBERS AND DISTRIBUTORS

THRESHING MACHINERY, TRACTORS,
AND CORN SHREDDERS

ABERDEEN, S. D.

THE dealer who takes on the responsibilities of an automotive dealer usually has a very clear conception of what those responsibilities imply. A characteristic statement comes from K. O. Lee & Son: "We keep several automobiles to use in looking after trouble in the field. We also have in stock a complete supply of repairs for our tractors and also a good stock of extra magnetos, so that when anything is needed in a hurry we can most generally supply it very quickly. We have discovered that in the tractor business service is what counts. Without reasonably good service in the tractor business one cannot hope to make a continued success of it."

PHONE 1031

E. EUGENE RAYMER

Tractors, Trucks and Automobiles

ACCESSORIES OF ALL KINDS

FIRE PROOF GARAGE

EXPERT WORKMANSHIP

FOND DU LAC, WIS.

THE automotive dealer is both a hustler for trade and a stickler for good business methods. The following, from E. Eugene Raymer, is typical of the class: "Every time that a tractor, truck or automobile leaves this place you can make up your mind that Raymer has a settlement for it. I sell everything on the plan of 'settle before you take it out of the garage.' Should anyone ever find anything unsatisfactory he has the privilege of returning it. I am not very strong on chasing people for sales, but I am the strongest man in the world for chasing people to give them service. And I might say if any man wants to build a business he must be fair, square, honest, honorable, select the right goods, sell them at one price, get his settlement before the goods go out of the house and keep the one word 'service' as his watchword. Just as long as you are in business service either will make or break you, one of the two."

Herewith are reproductions of letter-heads recently received which are distinctive and representative. These could be multiplied many times because they are becoming very numerous. These, however, are typical of the change now taking place in the character of the dealers handling automotive equipment.

NEWMAN TRUCK LINE

St. Louis, Mo., Dec. 27—The Harry Newman, Inc., will begin production Jan. 15 of a line of trucks in five sizes, ranging from 1 to 5 tons. The name of the truck will be announced as soon as the copyright measures now under way are completed. The truck will be assembled here of such standard parts as Timken-Detroit worm drive axle, Continental Red Seal engine, Stromberg carbureter, etc.

TO LIFT OIL RESTRICTIONS

Washington, Dec. 27—The Fuel Administration has asked the oil industry to lift all its voluntary restrictions on crude oil prices and distribution and on refined products. This removes the entire oil industry from Government supervision. Unless events prove the necessity of again exercising control, this release will be permanent.

The Administration points out, however, that licenses now outstanding will remain in force until the President's proclamation of peace, and all agreements made heretofore will continue subject to cancellation or assignment on request of the Fuel Admin-



J. B. GABELINE

DEALER IN

IMPLEMENTS, VEHICLES, HARNESS, AUTOMOBILES, ETC.

712-714 WEST JEFFERSON STREET

BURLINGTON, IOWA.

THE real automotive dealer believes in giving the buyer thorough instruction on everything sold to him. J. B. Gabeline says, "When we sell an auto, we teach the customer how to run it—that goes with the sale. Also when we sell any article in the implement line, no matter how small or how large it may be, we explain to the customer how to operate it and how to set it up, if we do not set it up ourselves—that goes with the sale. The same thing applies to the tractor business. We teach the customer how to run his tractor."

istration. The allocation of supplies of petroleum products for the Allies will end Feb. 1, and the priority orders for export of gasoline and kerosene will expire at the same time. However, the allocation of aviation gasoline for the Allies and the American Expeditionary Forces will continue until further notice is given.

PRICE OF FORDSON

To correct a misapprehension which has been occasioned in the minds of some dealers by an item which appeared in the Dec. 12 issue of MOTOR AGE it is proper to say that the price of the Fordson tractor, given at that time as \$750 f. o. b. Dearborn, Mich., applies only to such tractors as are shipped to distributors. In all cases the freight and service charge is added to this

price to make up the price charged the dealer. Also the concession permitting payments for carload shipments of Fordson tractors to be made upon delivery rather than sight draft attached to bill of lading applies only to tractors shipped to distributors. The old method still is in vogue for shipments made to dealers.

E-B TRACTOR SCHOOLS

Rockford, Ill., Dec. 27—The Emerson-Brantingham Implement Co. will commence its tractor schools Jan. 1. They will be run for E-B dealers in their own towns under the direction of the adjacent branch of the company. Men specially trained for this work at the home plant will be instructors and dealers will be schooled in design, operation and repair of tractors.

Many Tractor Prospects in Wisconsin State Absorbed 1200 in 1918

MILWAUKEE, Wis., Dec. 30—Wisconsin will furnish the tractor industry with an exceptionally fertile market during 1919, according to manufacturers and dealers who have given studied figures issued by the state department of agriculture. In 1918 a total of 8,784,761 acres of crops were raised in this state, compared with 8,689,354 acres in 1917 and 7,915,904 in 1916. While the increase since 1916 is considered a good one, it is felt that with more favorable means of prosecuting farm work such as the farm tractor provides, a much larger acreage would have been yielded.

1200 in 1918

It is estimated that Wisconsin absorbed from 1200 to 1500 tractors during 1918. This made it possible to increase the crop average over 1917 by 95,407 acres despite the fact that approximately 50,000 Wisconsin farmer boys were called to the colors within the period.

At this time it is figured that 3000 Wisconsin farmers own tractors. In view of the fact this state contains more than 80,000 farms of more than 100 acres each, the ratio is regarded as low and indicative of the large number of farms now without power machines which tractor dealers have available as potential tractor purchasers.

Some concern has been caused among tractor men, not alone in Wisconsin, but throughout the country, that the sudden

end of the war might remove the stimulation to agriculture and food production which was furnished during the last year or two by the enormous demands of European nations which were devoting their energies to self-preservation and compelled to neglect tillage of the soil. However, since steps have been taken to guarantee to the farmers of the United States the same minimum price for the basic crop, wheat, which was granted them in 1917 and 1918, the outlook is considered encouraging. The inducement to continue to push food production, which means continued enlargement of crop acreage, is thereby sustained. While the farm labor supply in 1919 will be more liberal than in 1918, the need of power farm machinery to supplant manual labor is as pressing as it ever has been.

Tractor men feel that Wisconsin farmers have only begun to form an intimate acquaintance with the tractor. While a considerable number of farmers owned tractors in 1917, it was not until 1918 that the power farm machine came into the wide use that created universal interest in the tractor and compelled the neighbor of the farmer who owns a machine to watch its performance with a greater or lesser desire to own one himself.

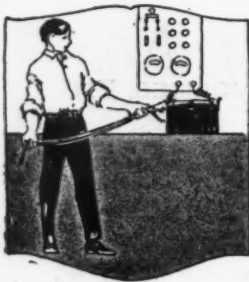
The result of tractor experience in Wisconsin during 1918 has been to set even the small farmers to talking tractors. The

distribution of the 3000 tractors in this state is such that about one in every four large farms in the more densely populated communities possesses a machine. The remaining three farmers have watched the fourth with keen interest, and they have received a most favorable impression, which the tractor trade should be able to capitalize without difficulty during the new year.

Many tractor demonstrations are being planned in various sections of the state during the coming spring. Thus far only a few of these events have been conducted in Wisconsin, but the results have more than justified the expenditure of time, effort and money. In the southern counties, groups of dealers are arranging to reach virtually every farmer in each district by means of the practical demonstration.

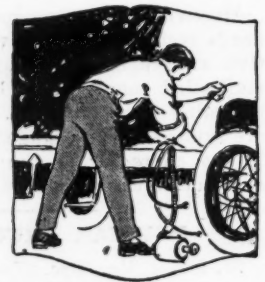
SELF-STARTING LAUSON READY

New Holstein, Wis., Dec. 31—That Lauson tractors now can be had with the Christensen starter as regular equipment is announced by the John Lauson Mfg. Co. This starter is designed to make the tractor as easy to start as the well-equipped passenger car engine. The device has been described in recent issues of MOTOR AGE and a report of tests of the starter applied to the Lauson tractor was published in MOTOR AGE for Dec. 19.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the 127th installment of a weekly series of articles begun in MOTOR AGE, issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at \$2.50. The remainder of the series will be published as a supplementary volume.

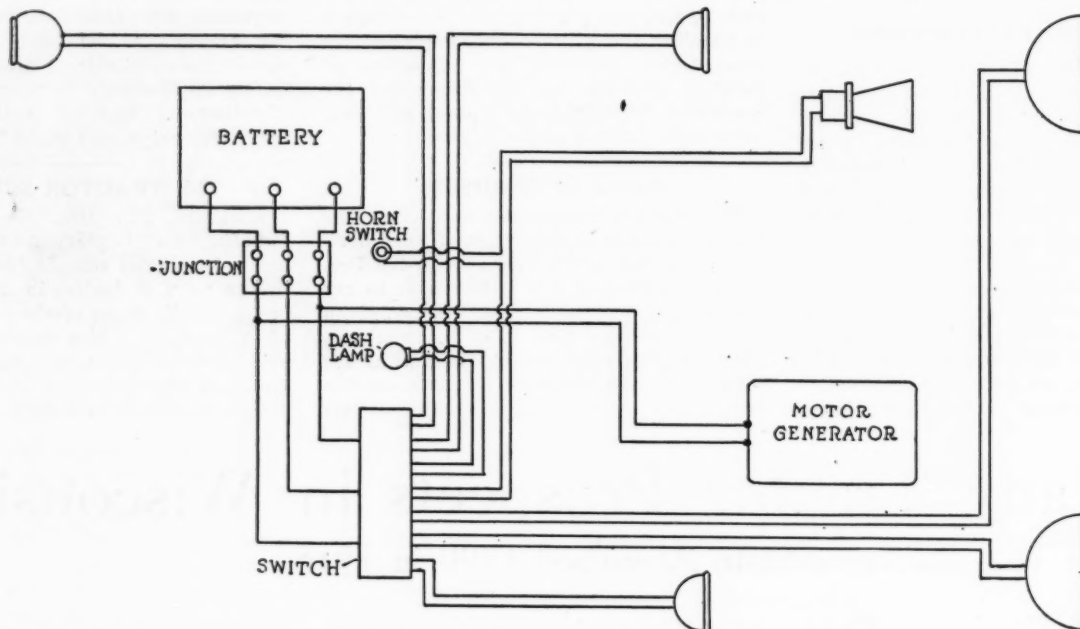


Fig. 653—Wiring diagram of Wagner on 1913 Studebaker 35 and six

Part CXXVII—Wagner Electrical Systems

A 12-VOLT combined generator and motor was used in the early model of the Wagner single-unit, two-wire system on the 1913 Studebaker 35 and six cars. The machine has four poles, and each pole is provided with a shunt and series winding. The armature of the machine has two independent windings and, therefore, two commutators. The armature of the electrical unit is driven direct from the engine through a set of spur gears when it is operating as a generator. When the electrical unit is operating as a starting motor the armature is connected to the crankshaft of the engine by a special planetary gear.

The starting switch is of the drum type. It is mounted on top of the electrical unit and operated by a rod which extends through the dash of the car and terminates in a handle within easy reach of the driver. The lever operating the starting switch also controls the friction band which puts the planetary gear into operation.

The regulation of the generator output is accomplished by the third-brush type of regulation in combination with a reversed series field.

The cutout is of the electromagnetic type and automatically connects the generator to the battery, when the generator voltage is high enough to charge the battery, and disconnects the two when the battery starts to discharge through the generator due to the voltage of the generator being lower than the voltage of the battery.

A wiring diagram of this system is shown in Fig. 653. When the starting switch is thrown to the starting position the full 12 volts of the battery are used, and when the switch is thrown to the running position it permits the use of a 6-volt lighting system and a three-wire arrangement of the electrical system. If the starting and generating circuits are traced carefully, it will be found that the armatures are in parallel for motor action and the magnetic field is produced by the series coil, while for generator action the armatures are in series and half the shunt field is connected across each armature.

A wire is run from the center of the battery to the lighting switch, and the lamps are operated on a three-wire system, half the battery voltage being applied to any one lamp.

Wagner 1914 Two-Unit System

The starting motor in the Wagner 12-volt, two-unit, two- and three-wire systems of 1914 is a four-pole series-wound type equipped with a gear reduction for reducing the speed of the engine in relation to the speed of the motor so it will be suitable for cranking the engine. An end view of the starter and gear with the gear-housing cover removed is shown in Fig. 654. The gear equipment consists of a small steel pinion, A, on the motor shaft which meshes with a larger steel gear, B, on the back shaft, thereby reducing the speed. The back shaft is equipped with an

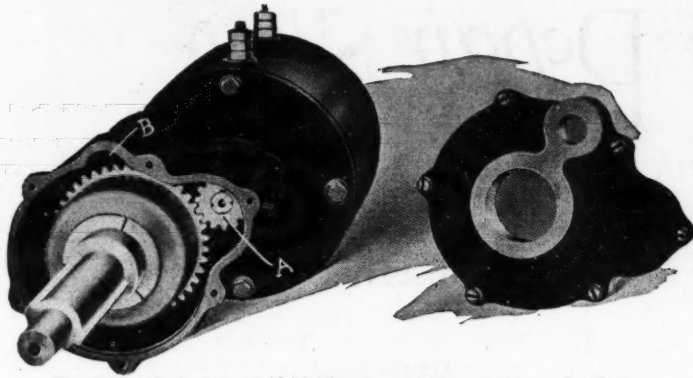


Fig. 654—End view of 1914 Wagner starting motor and reduction gearing

over-running clutch which locks when the engine is being cranked and releases as soon as the engine fires.

The starter is connected to the engine by a pinion on the back shaft, which meshes with a gear on the engine flywheel. The pinion is placed on the back shaft and is so arranged that it can slide on the shaft as it is thrown in and out of gear by the lever V, shown in Fig. 655. The electrical connection between the starting motor and the battery is controlled by a switch, W, Fig. 655, which also is operated by the lever V. The starting operation is accomplished by pushing the lever V forward. When the lever is restored to its original position the pinion is thrown out of mesh and the starting switch is opened.

A view of the generator with the commutator cover removed is shown in Fig. 656. It is a four-pole, shunt-wound machine, which may be driven by the engine through a train of gears, chain or by some other means, which depend upon the particular installation.

The generator output is regulated by the third-brush method. A small cartridge fuse, Fig. 656, is connected in the shunt-field circuit. If from any cause the generator is operated on open circuit, such as with the battery removed from the car or disconnected, the tendency of the field current is to increase to an abnormal value, which will cause the voltage to rise to an abnormal value. The fuse will blow before the field current gets too high and thus prevent the voltage rising to an excessive value, as the generator will not generate if the field circuit is open.

The cutout relay is designed to be located on the dash and is of the customary type, having two windings. One of these

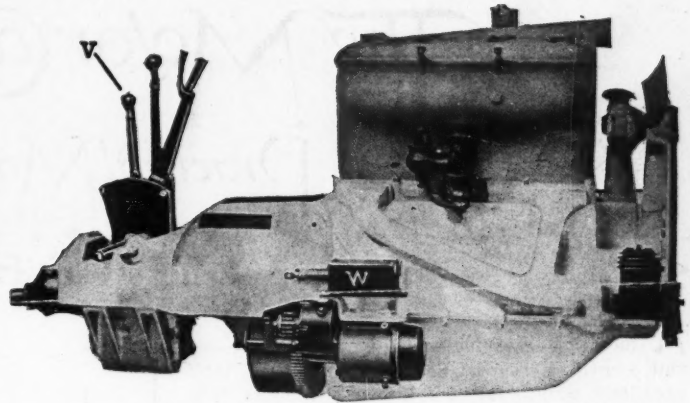


Fig. 655—Method of mounting 1914 Wagner starting motor and starting switch on engine. Switch W is controlled by lever V

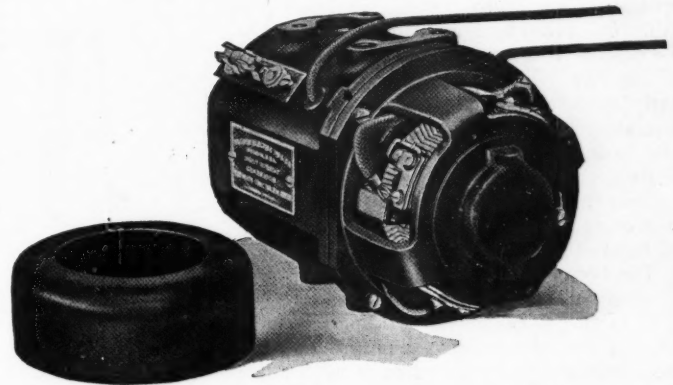


Fig. 656—Wagner 1914 generator with the cover removed

windings, called the series windings, carries the current to or from the battery, depending upon whether it is charging or discharging, and the second winding, called the shunt winding, has a current in it which varies directly as the voltage, as this winding is connected across the line.

The electrical connections of a system of this kind are shown diagrammatically in Fig. 657. The lights are operated on a three-wire system, and a neutral wire is run from the center of the battery to the lighting switch, as shown in the figure.

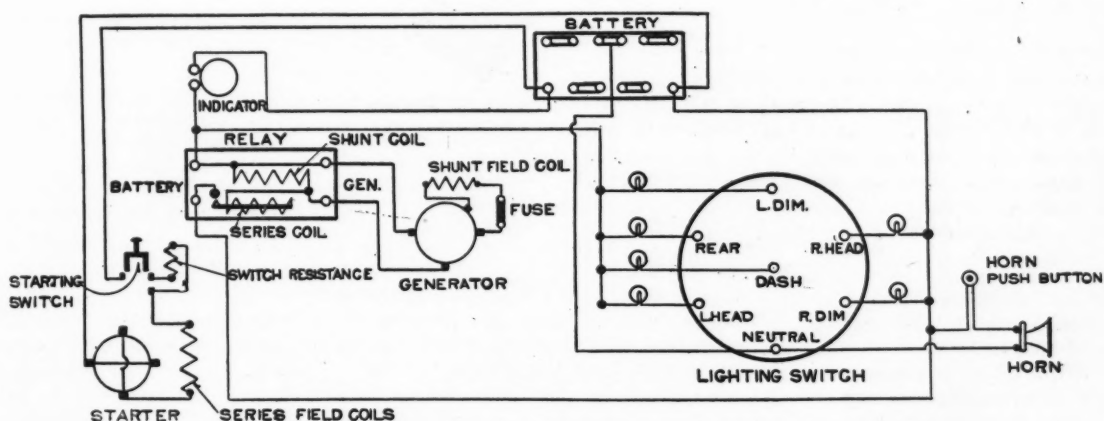


Fig. 657—Typical wiring diagram of 1914 Wagner installation on a motor car

FURTHER MOTOR TRANSPORT

Louisville, Ky., Dec. 27—A daily motor transport service, of which this city will be the hub, between Louisville and Cincinnati, Louisville and Nashville, Louisville and Owensboro and Louisville and Indianapolis and all way points is contemplated by Harry F. Hann, Winston Salem, N. C., and others. Mr. Hann is in Washington

this week conferring with experts of the Department of Agriculture and other road engineers. Freight and express rates and the number of trucks to be used have not been determined. If his project, now well under way, does not miscarry, the new motor transport service out of Louisville will likely be in operation as soon as the roads permit in the spring.

ENGINES FOR PEACE TIMES

Swissvale, Pa., Dec. 28—The Union Switch & Signal Co. has about completed a large Government contract for airplane engines and contemplates using the facilities, organization and experience thus gained in the manufacture of high-grade engines for passenger car and truck service.

The Motor Car Repair Shop

Practical Maintenance Hints

What Owners Can Do to Help Themselves

A GOOD grade of air-drying enamel and finishing varnish—mixed two-thirds and one-third, respectively—will make an excellent paint for quick work. Spots where the paint has been broken and where rust has manifested itself can be touched up with this mixture successfully and it will dry over-night. Steel wool—or possibly fine sandpaper or emery—should first be used to remove all traces of rust.

Top bow hinges should be oiled, particularly after a rain; it will remove many a squeak. So also should the fasteners for the side curtains, which soon become rusted.

Door hinges and latches generally are neglected; they should have a treatment of light oil once in a while.

The bonnet hinge also will be preserved if oiled occasionally.

It is the work of half an hour or so to take a set of wrenches and go over the nuts that are to be found on lamp bracket supports, tire carrier, fenders, hood and similar parts. This will remove from 50 to 60 per cent of the rattles and squeaks.

Hood latches and, in fact, every metal part touching another metal part should have a thin film of oil once in a while; it will save wear and noise.

If the glass in the windshield becomes loose in the frame and permits rain to creep through, run in a little shellac and after it has hardened put in a little more, until the crack has been entirely filled up.

When you know you are going out into the rain, rub a film of oil on nicked parts; this will prevent rust from creeping under the plating.

Warmed vinegar can be used to clean the celluloid in the side curtains.

Engine, Transmission, Starter

If water drips from a hose connection, it is the work of a minute to take up the hose clamp bolts with a screwdriver.

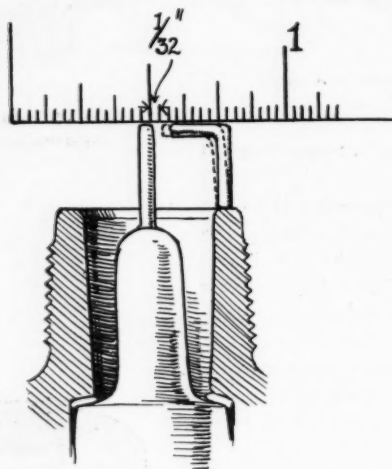
Fan belts may be tightened, usually, with the aid of a single wrench. A tight belt prevents wear and also assures cooling.

Oil the timer or distributor, according to your instruction book, at least once a week; it will save binding.

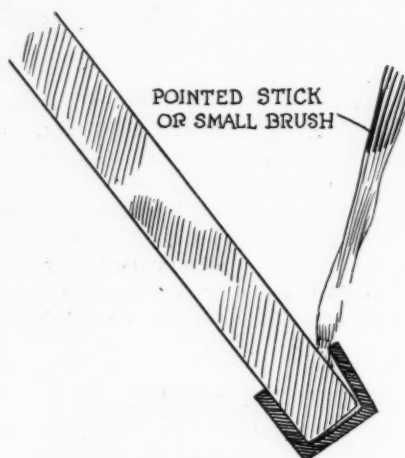
Ten minutes with a set of wrenches will tighten every nut on an engine and may be the means of destroying several knocks that have not been located. Do not forget the nuts that hold the cylinder block to the base; many a pound has been caused by these nuts being slack.

If the entire mechanism is oiled carefully and religiously once each and every week, you seldom will have trouble.

Spark plug points are eaten off by the action of the current; they should be set with $\frac{1}{32}$ in. gap about once in three months and each should be the same as the other,



Spark plug gaps should be $\frac{1}{32}$ in. always



If the glass in the windshield becomes loose, the crack can be filled with shellac

otherwise you will have a very jerky engine.

See that the wires are clean at connections or where they are attached with binding posts; and tighten every post once a month or oftener.

Three or four times a year the distributor brushes should be wiped off; likewise the collector ring on a magneto, which will accumulate dust from the carbon brushes.

Once a season at least clean out the radiator with a solution of washing soda. This should be dissolved and 2 gal. put in the radiator. Let this remain in for 48 hr. and then drain and flush with clear water. After running another day flush again and the radiator and engine water spaces will be clean.

A leather-faced cone clutch can be kept in splendid condition by the application of neatsfoot oil once a month.

Do not forget to have the battery filled with distilled water at least once a month.

Jack up the front axle by one jack in the middle. Two may be used if handy. Try the wheel for loose bearings and tighten the nuts back of the hub cap. At the same time fill the hub cap with grease, and when screwed into place the grease will be forced into the bearings.

Measure the front wheels between the felloes both front and rear; there should be $\frac{1}{2}$ to $\frac{3}{8}$ in. more spread in the back than in front.

Try the steering arm, tie bar and spring clip nuts; you will generally find one or more loose.

Brake rods and clevises are sadly neglected; they ought to have careful inspection, else a bad accident may result. And oil them, too. It isn't much of a job to crawl under a car if you will run it over a hollow spot in the ground.

Look into the differential case and see if it doesn't need grease; 10 to 1 it does.

Brakes can be improved by applying ordinary lubricating oil once a week. Jack up the rear axle, put on plenty of oil, have some one gently apply the brake while you turn the wheel. This will distribute the oil, which, in turn, will soften the lining and raise the fiber so it will permit gentle but sure braking. Do this at night so the car can stand for 10 hr.; otherwise the brakes will not work.

Universal joints are hard to reach, but they must not be neglected in the matter of lubrication.

Where rust spots appear on the chassis, clean with steel wool and apply some form of enamel. Shellac will do for a temporary job.

Tires ought to be removed from the rims two or three times a year, the rims cleaned of all rust and then covered with aluminum paint, black enamel or graphite. This will make tire changing easier and will preserve both casing and rim.

Metallic running boards may be treated with the two-thirds enamel and one-third varnish preparation, after the rust has been removed with steel wool.

Fenders should be straightened immediately, and if the varnish or enamel is chipped the spot should be covered with enamel.

Touching Up Parts

Nothing is more distressing and unsightly than a scratched fender, a big rust spot somewhere about the car that has been permitted to enlarge for lack of attention, or any other black or enameled part that has lost its finish. And the remedy is so simple that it will well repay any shop to give this subject a little thought.

Almost any owner will willingly pay for the time put in on a little touching-up job if he knows it will not only last a reasonable length of time but will look fairly well—at least far better than the fracture in the finish that daily stares him in the face, besides the thought that little by little the metal is being eaten away, meaning some new and expensive part in the very near future.

This work can be accomplished just before quitting time in the evening and left to harden over night, with the result that it is an accomplished and successful job in the morning, pleasing to the owner, making a little for the shop and with a better looking car leaving the place.

It has been most successfully worked with two simple elements—coach varnish and black enamel. In a particular instance an owner used a proportion of two-thirds of Murphy's black finishing enamel and a third of finishing varnish obtained at a motor car painting establishment. The result was more than satisfactory, though this proportion required a little over 24 hr. to dry well. Naturally enough the greater proportion of enamel, the quicker it will dry, but the finish will not be as glossy nor will it hold to metal as well as if more varnish is used.

In the case mentioned the owner went over the rust spots with steel wool to remove all roughness and to get down to the metal itself. Steel wool, also, will chamfer off the edges of the enamel or paint, so that when the enamel-varnish mixture is applied there is hardly a trace of the edges remaining.

Of course the car must be protected against dust settling on the freshly applied enamel; otherwise, it will be rough, for the quick drying qualities will hold any dust instantly. The enamel should be applied with a varnish brush, the size depending upon the amount of work to be done, and it should be spread on in much the way a varnish flows on varnish.

Making Tube Carriers

Any dealer can make a nice little profit—and any motorist can save money—by making tube carriers from almost any old material in the way of cloth, leather, imitation leather, etc.

Not one motorist in a hundred goes to the trouble of protecting the spare tubes carried in his car. It is usually a case of tie them up any old way and throw them under the seat only to rub against some metal part, to be worn at the edge and to be useless when wanted. Or they are permitted to become soaked with oil or allowed to suffer because of contact with some rusty metal piece.

Top makers always have scraps that would serve splendidly for tube carriers, and if all the scraps were turned into this direction, it would bring a source of profit and save waste as well.

Even the quilting societies of the neighborhood churches could turn their attention toward making such a necessity and put on a sales campaign that would bring astonishing results in the way of money returns.

A tube when it is new and comes from a factory usually is rolled, but after it has

once been repaired it is laid flat and always folded with the valve stem in and a quarter the length of the tube. So, by folding the tube this way, with the air out, the length, width and thickness of the cover necessary to inclose the tube easily, can be determined.

It is not necessary that one piece of material be employed, for if patched so the seams are outside the tube will not be injured. A tube carrier should be laid out somewhat after the design shown in Fig. 2, although this may be modified to meet the requirements of the material. Heavy duck, old seat cover material, top covering or anything that is reasonably heavy will do for material, and it is not at all necessary that the edges be hemmed.

In the illustration the flaps A A naturally would be turned over the end of the tube first and held together by ordinary snaps. Then the side flaps can be brought over and also held by snaps, with two on this piece to prevent the tube from working out.

With such a protector any tube may be placed in practically any part of the car so long as oil cannot reach it and the tube will not suffer by rubbing against anything. Naturally the tighter the tube can be bound in the carrier the less liability for damage through rubbing, for it will be held firmly in its nesting place.

Fitting Bearings

Bearings are frequently jeopardized by being improperly fitted, allowed too much play on the spindle or inside the hub or not being adjusted to keep them in alignment. This applies to either ball or roller bearings.

Take the case of a front wheel bearing as a sample, which will illustrate the point in other cases. In this case the outside race is lodged firmly in the hub of the wheel but not so firmly that it readily can-

not be removed. This is for two purposes, to permit it to be removed without nearly destroying it and for making it slightly flexible, to account for any minute irregularity of the inside of the wheel hub.

Likewise the inside race goes over the spindle, for instance, but while it should be a snug fit, demanding a slight tapping with a piece of pipe placed over the spindle, it should not be such a close fit as to demand being driven home by heavy blows with a 3- or 4-lb. hammer. In neither case should there be any appreciable play between the hub and the outer race or between the spindle and the inner race, for it is easy to see that this will cause the wheel to run out of true and to permit the race to rotate on the spindle and keep wearing it down.

When such wear occurs it means either a new spindle or, if there is stock enough, to turn it down a trifle and put on a bushing to take up whatever is necessary to make a snug fit. Where there is not enough stock it would be far safer to put in new spindles.

This is shown at B in Fig. 1. Usually the point B is larger than the remainder of the spindle, and in all probability there would be sufficient stock to permit the spindle being turned down a little, enough to take a thin bushing of steel. This can be heated and shrunk on, and the bushing then can be ground to fit the inside of the inner race, at A.

Naturally no bushing can be inserted in the inner race, for that is hardened, and besides it would mean the work over every time a new bearing is needed. There are so many sizes of bearings, and they are made for so many purposes that it might be possible to turn down the spindle slightly and find a bearing whose diameter inside the inner race would come to fit correctly, but it would be necessary to furnish the bearing maker or agent with the size of the spindle before he could tell whether he had a size that would permit this course.

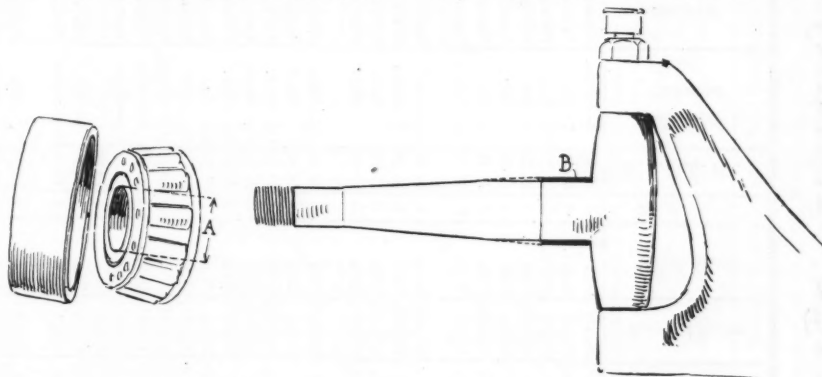


Fig. 1—Fitting bearings so they will be properly aligned

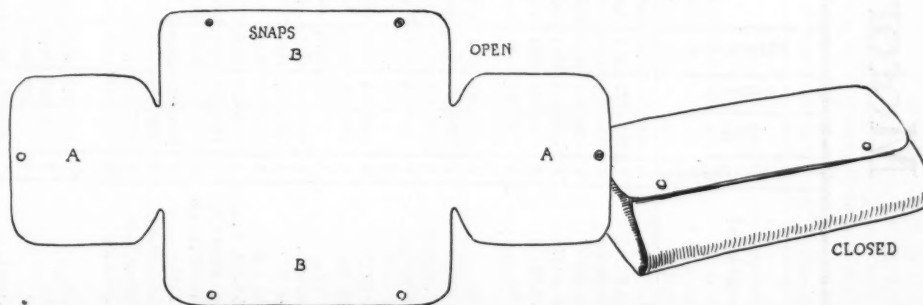


Fig. 2—Suggestion for making tube carrier out of top scraps, etc.

Motor Age Monthly Passenger Car Specification Tables

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N.A.C.C.H.P.	Carburetor	Fuel Feed	Clutch	Gearbox	Universal	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Allen 41.	6	1105	112	12x3 1/2	optional	3 1/2 x 5	Ow	4	22.50	1-Stron.	Vacuum	B. and B.	Ow	Warner	Adams	Ditweiler	Stewart	Firestone	6	100	U. S. L.	A-L	A-L	Conn.	6	Allen 41.
American B.	7	1805	122	32x4	Firestone	3 1/2 x 5	Ruten.	6	23.44	1-Zen.	Vacuum	B. and B.	G-L	Warner	Salisbury	Gemmer	V. Sicklen	Jackson	6	100	Col.	West.	West.	A-K.	6	American B.
American Beauty 1.	5	2000	121	32x4 1/2	Federal	3 1/2 x 4 1/2	Cont.	6	23.44	1 1/2-Ray.	Vacuum	B. and B.	Warner	Arvac	Timken	Warner	Stewart	Firestone	6	80	Willard	West.	West.	Remy	6	American Beauty 1.
Anderson 400-A.	7	1750	120	32x4	optional	3 1/2 x 5	Ow	8	25.35	1-Zen.	Vacuum	B. and B.	Durston	Starling	Col.	Jacob	Stewart	Firestone	6	90	Willard	Bijur	Conn.	6	Anderson 400-A.	
Apperson 8-18.	7	4000	130	32x4	optional	3 1/2 x 5	Ow	8	33.80	John.	Vacuum	B. and B.	G-L	Hart.	Col.	Jacob	Stewart	Firestone	6	80	Willard	Remy	Remy	6	Apperson 8-18.	
Auburn 6-39.	5	1505	120	32x4	Goodrich	3 1/2 x 4 1/2	Cont.	6	25.35	1-Ray.	Vacuum	B. and B.	Muncie	Spicer	Ow	Lavine	Warner	Firestone	6	80	Willard	Delco	Delco	6	Auburn 6-39.	
Austin 12.	6	4250	142	34x4 1/2	Goodrich	2 7/8 x 5	Weid.	12	39.68	1 1/2-Stron.	Vacuum	Muncie	Warner	Spicer	American	Gemmer	Warner	Firestone	6	90	Willard	G. & D.	Eise.	6	Austin 12.	
Biddle H.	4	2750	121	32x4	optional	3 1/2 x 5 1/2	Buda	4	22.50	1 1/2-Zen.	Vacuum	Warner	Warner	Spicer	Ow	Gemmer	Warner	Firestone	6	90	Willard	G. & D.	Eise.	6	Biddle H.	
Briscoe 4-24.	5	835	104	30x3 1/2	optional	3 1/2 x 5 1/2	Ow	4	15.20	1-Buick	Gravity	Ow	Ow	Ow	Ow	Ow	Stewart	Starwell	6	80	U. S. L.	A-L	Conn.	6	Briscoe 4-24.	
Buick H-45.	5	118	33x4	Goodyear	3 1/2 x 4 1/2	3 1/2 x 4 1/2	Ow	6	27.34	Mar.	Vacuum	Ow	Ow	Ow	West-Mott	Ow	Stewart	Starwell	6	60	U. S. L.	Delco	Delco	6	Buick H-45.	
Buick H-49.	7	124	34x4 1/2	Goodyear	3 1/2 x 4 1/2	3 1/2 x 4 1/2	Ow	6	27.34	Mar.	Vacuum	Ow	Ow	Ow	West-Mott	Ow	Stewart	Starwell	6	60	U. S. L.	Delco	Delco	6	Buick H-49.	
Cadillac 57.	7	3220	125	35x5	optional	3 1/2 x 5 1/2	Ow	8	31.25	1 1/2-Ow	Pressure	Ow	Ow	Ow	C-Timk.	Ow	V. Sicklen	Kelsey	6	117 1/2	Willard	Delco	Delco	6-3	Cadillac 57.	
Campbell C-4.	5	1000	110	30x3 1/2	Goodyear	3 1/2 x 4	Cont.	4	24.03	Sund.	Vacuum	B. and B.	G-L	Ow	Salisbury	Ow	Stewart	Starwell	6	117 1/2	Willard	A-L	Ow	A-K.	6	Campbell C-4.
Case U.	7	1565	117	32x4	optional	3 1/2 x 4 1/2	Ow	6	25.35	1-Ray.	Vacuum	Ow	Ow	Stanwell	Col.	Jacob	Stewart	Kelsey	6	93	Willard	West.	West.	6	Case U.	
Chalmers 6-30.	5	1705	123	32x4	Goodyear	3 1/2 x 5	Ow	6	29.40	1 1/2-Ray.	Gravity	B. and B.	Ow	Ow	Ow	Ow	Stewart	Kelsey	6	100	Willard	West.	West.	Remy.	6	Chalmers 6-30.
Chandler.	7	1705	123	32x4	Goodyear	3 1/2 x 5	Ow	4	21.76	1 1/2-Zen.	Vacuum	Ow	Ow	Ow	Ow	Gemmer	Stewart	Kelsey	6	100	Willard	West.	West.	Remy.	6	Chandler.
Chevrolet 4-90.	5	735	102	30x3 1/2	Goodyear	3 1/2 x 4	Ow	4	21.76	1 1/2-Zen.	Vacuum	Ow	Ow	Ow	Ow	Warner	Stewart	Kelsey	6	50	Prest.	Delco	Delco	6	Chevrolet 4-90.	
Chevrolet F.A. 5 and 2	5	1015	108	32x3 1/2	Goodyear	3 1/2 x 5 1/2	Ow	8	39.20	1 1/2-Zen.	Vacuum	Ow	Ow	Ow	Ow	Ow	Stewart	Kelsey	6	50	Prest.	Delco	Delco	6	Chevrolet F.A. 5 and 2	
Cole Aero Eight 870.	5	2505	127	35x5	Goodrich	3 1/2 x 4 1/2	Cont.	8	39.20	1 1/2-Stron.	Vacuum	B. and B.	Ow	Ow	Col.	Gemmer	Stewart	Kelsey	6	80	Prest.	Delco	Delco	6	Cole Aero Eight 870.	
Columbia CD and CS.	5	115	112	32x4	Firestone	3 1/2 x 4 1/2	Cont.	6	25.35	1-Stron.	Vacuum	B. and B.	Ow	Ow	Timken	Gemmer	Stewart	Firestone	6	75	Willard	Dyn.	Dyn.	6	Columbia CD and CS.	
Comet C-51.	5	1085	125	33x4	optional	3 1/2 x 5 1/2	Cont.	6	29.40	1 1/2-Ray.	Vacuum	B. and B.	Ow	Ow	Col.	C. A. S.	Stewart	Firestone	6	80	Willard	Dyn.	Dyn.	6	Comet C-51.	
Commonwealth 4-40.	5	1005	115	32x3 1/2	optional	3 1/2 x 5	Gray	4	19.60	1-Zen.	Vacuum	B. and B.	Ow	Ow	Ow	Ow	Stewart	Firestone	6	80	Willard	Dyn.	Dyn.	6	Commonwealth 4-40.	
Crow-Elkhart K-36.	5	1250	132	35x5	optional	3 1/2 x 5	Ow	8	45.00	1 1/2-Stron.	Vacuum	B-L	Ow	Ow	Peru	Ow	Ditweiler	Firestone	6	120	Willard	West.	West.	6	Crow-Elkhart K-36.	
Cumingham V-3.	7	127	34x4 1/2	optional	3 1/2 x 5	3 1/2 x 5	H-S	8	33.80	1-Zen.	Vacuum	B-L	Ow	Spicer	Timken	Gemmer	Stewart	Firestone	6	100	Willard	West.	West.	6	Cumingham V-3.	
Daniels B.	7	124	34x4 1/2	optional	3 1/2 x 5 1/2	3 1/2 x 5 1/2	Cont.	6	29.40	Strom.	Vacuum	B. and B.	Warner	Ow	Ow	Ow	Stewart	Firestone	6	100	Willard	West.	West.	6	Daniels B.	
Davis J.	7	119	31x4	optional	3 1/2 x 4 1/2	3 1/2 x 4 1/2	Cont.	6	25.35	Strom.	Vacuum	B. and B.	Warner	Ow	Ow	Ow	Stewart	Firestone	6	100	Willard	West.	West.	6	Davis J.	
Dixie Flyer L.	5	1095	112	32x3 1/2	Goodrich	3 1/2 x 5	Lyco.	4	16.90	1-Carter	Vacuum	B. and B.	G-L	Ow	Peru	Ow	V. Sicklen	Firestone	6	60	Willard	Dyn.	Conn.	6-3	Dixie Flyer L.	
Dodge Brothers.	5	1035	114	32x3 1/2	optional	3 1/2 x 4 1/2	Ow	4	24.03	1-Stew.	Vacuum	Ow	Ow	Ow	Ow	Ow	J. Man.	Firestone	12	115	Willard	N. E.	N. E.	12	Dodge Brothers.	
Dorris 6-80.	7	3500	132	35x5	optional	4x5	Ow	6	35.40	1 1/2-Stron.	Vacuum	B-L	Ow	Spicer	Timken	Warner	Stewart	Firestone	6	85	Willard	West.	West.	6	Dorris 6-80.	
Dort 15.	5	935	105 1/2	30x3 1/2	Goodyear	3 1/2 x 5	D-Lyco.	4	19.60	1-Carter	Gravity	Ow	Ow	Mechanics	Ow	Jacob	Stewart	Firestone	6	105	Willard	West.	West.	6	Dort 15.	
Elcar.	5	1175	116	32x3 1/2	Firestone	3 1/2 x 5	Lyco.	4	19.60	1-Carter	Vacuum	Mechanics	Ow	Ow	Salisbury	Ow	Stewart	Firestone	6	90	Willard	Dyn.	A-K.	6	Elcar.	
Elcar.	5	1375	116	3 1/2 x 4	Firestone	3 1/2 x 4 1/2	Cont.	6	25.35	1 1/2-Stron.	Vacuum	B. and B.	Muncie	Ow	Salisbury	Ow	Stewart	Firestone	6	90	Willard	Dyn.	A-K.	6	Elcar.	
Elgin Series H.	5	1395	118	32x4	optional	3 1/2 x 4 1/2	Falls	6	23.44	1-Stron.	Vacuum	B. and B.	Mechanics	Ow	Adams	Ow	Stewart	Firestone	6	90	Willard	Dyn.	A-K.	6	Elgin Series H.	
Essex A.	5	1083	108 1/2	32x4	optional	3 1/2 x 5	Ow	4	18.23	Ow	Vacuum	Ow	Ow	Ow	Timken	Ow	Stewart	Firestone	6	105	Willard	Delco	Delco	6	Essex A.	
Ford T.	5	100	30x3 1/2	Goodyear	3 1/2 x 4	3 1/2 x 4	Ow	4	22.50	H-K	Gravity	Ow	Ow	Ow	Ow	Ow	Stewart	Firestone	6	105	Willard	Delco	Delco	6	Ford T.	
Franklin 9.	5	2450	115	33x4 1/2	Goodyear	3 1/2 x 4	Ow	6	25.35	1-Ow	Vacuum	B. and B.	Ow	Ow	Ow	Ow	Stewart	Firestone	6	105	Willard	Dyn.	A-K.	12	Franklin 9.	
Geronimo.	7	1595	122	32x4	Goodyear	3 1/2 x 5	Ruten.	6	23.44	1-Stron.	Vacuum	B. and B.	Ow	Ow	Ow	Ow	Stewart	Firestone	6	88	Willard	Dyn.	Delco	6	Geronimo.	
Glide 6-40.	5	1655	119	34x4	Goodyear	3 1/2 x 5	Ruten.	6	23.44	1-Ray.	Vacuum	Ow	Ow	Ow	Ow	Ow	Stewart	Firestone	6	80	Willard	Dyn.	Delco	6	Glide 6-40.	
Grant.	5	114	32x3 1/2	Goodyear	3 1/2 x 4 1/2	3 1/2 x 4 1/2	Ow	6	21.60	Strom.	Vacuum	Ow	Ow	Ow	Ow	Ow	Stewart	Firestone	6	80	Willard	Dyn.	Delco	6	Grant.	

Engines—Ruten., Rutenber, Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Tector-McFarlan; S., Monson or Duesenberg; R. & V., Root & Vandervoort. Carburetor—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kington; Newc., Newcomb; Schel., Scheller; Tillot., Tillotson; Johns., Johnston. Ignition—A-K., Atwater-Kent; Conn., Connecticut; Eise., Eiseemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berlin; Bosch-W., Bosch-Westinghouse; Split., Splittorf. Gearset—G-L., Grant-Lee; North., Northway; B-L., Brown-Lipe; Columbia, W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. Universal—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. Speedometer—J-Man., Johns-Mansville; V-Sicklen, Van Sicklen. Tires—

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. H. P.	Carburetor	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Haroun.....	5	995 106	30x33	31x5 1/2	31x5 1/2	31x5 1/2	G. B. & S.	4	16.90	1-Stron.	Vacuum	Own	Mechanics	Adams	Genmer	Stewart	Stanweld	6	80	Willard	Remy	Remy	A-K.	6-3	Haroun.
Harvard 4-20.....	2	850 100	28x3	31x5 1/2	31x5 1/2	31x5 1/2	G. B. & S.	4	14.40	7/8-Zen.	Vacuum	G. B. & S.	G-L	Spicer	Peru	Barnes	6	100	National	Wagner	Wagner	A-K.	6-3	Harvard 4-20.
Hayfield A.....	5	1180 115	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	12	22.50	1-Zen.	Vacuum	B. and B.	Own	Own	Own	Jacox	Stewart	.....	6	120	Willard	Dyn.	Conn.	6	Hayfield A.
Haynes 46.....	7	127 127	31x4 1/2	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	29.40	1 1/4-Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Hook	6	120	Willard	L-N.	Delco	6	Haynes 46.	
Haynes 45.....	7	127 127	31x4 1/2	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	29.40	1 1/4-Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Firestone	6	120	Willard	L-N.	Delco	6	Haynes 45.	
Holler 206.....	5	1595 116	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	25.35	Stew.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	6	50	Gould	A-C.	Remy	6	Holler 206.	
Holler 198.....	5	1695 116	31x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	8	33.80	Stew.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	6	50	Gould	Split.	A-K.	6	Holler 198.	
Holmes.....	7	2000 126	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	29.40	1 1/4-Newc.	Vacuum	B-L	Own	Spicer	Timken	Genmer	Stewart	V. S. Elgin	12	100	Col.	Dyn.	Eise.	12-6	Holmes.	
Hudson M.....	7	1253 125	35x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	29.40	1 1/4-Ray.	Vacuum	Own	Own	Genmer	Timken	Genmer	Stewart	Kelsey	6	87 1/2	Exide	Delco	Delco	6	Hudson M.	
Hupmobile R.....	5	1500 112	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	16.90	1 1/4-Stron.	Vacuum	Own	Own	Detroit	Own	Jacox	Stewart	Firestone	6	87 1/2	Willard	West.	A-K.	6	Hupmobile R.	
Inter-State T.....	5	114	33x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	19.60	1-Zen.	Vacuum	Own	Own	.....	Own	.....	.....	.....	6	87 1/2	Willard	West.	A-K.	6	Inter-State T.
Jackson.....	5	118	37x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	8	28.80	Zen.	Vacuum	B. and B.	Covert	.....	Salisbury	Foster	Stewart	Firestone	6	120	Pres.	A-L.	West.	6	Jackson.
Jones.....	7	2100 125	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	29.40	1 1/4-Ray.	Vacuum	B. and B.	B-L	Arvae	Timken	Warren	Stewart	Firestone	6	120	Pres.	West.	West.	6	Jones.	
Jordan.....	7	2775 127	33x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	29.40	1 1/4-Ray.	Vacuum	B. and B.	Detroit	Sterling	Timken	Genmer	Stewart	Firestone	6	109.8	Willard	Bijur	Delco	6	Jordan.	
King F.....	7	2370 120	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	8	28.80	1 1/4-Ball	Vacuum	B. and B.	Own	Spicer	Col.	Jacox	Stewart	Stanweld	6	117.5	Willard	Bijur	A-K.	6	King F.	
Kinsel Kar.....	7	2500 124	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	27.50	1 1/4-Stron.	Vacuum	Warner	Own	Spicer	Own	Jacox	Stewart	Firestone	6	90	Willard	Remy	Remy	6	Kinsel Kar.	
Kline Kar 6-42.....	5	1865 121	33x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	25.35	1-Ray.	Vacuum	B. and B.	G-L	.....	Hess	Wohlrab	Stewart	Firestone	6	90	Pres.	West.	Conn.	6	Kline Kar 6-42.
Lexington R-19.....	5-7	1785 122	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	25.35	1-Ray.	Vacuum	B. and B.	Warner	Hardy	Hess	Warner	Stewart	Firestone	6	100	Willard	West.	Conn.	6	Lexington R-19.	
Liberty 10-B.....	5	1570 115	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	25.35	1-Stron.	Vacuum	B. and B.	Detroit	Spicer	Timken	Jacox	Stewart	Firestone	6	88	Willard	Delco	Delco	6	Liberty 10-B.	
Locomobile 38.....	7	5500 142	37x5	41x5 1/2	41x5 1/2	41x5 1/2	Own	6	43.60	Own	Pressure	Own	Own	.....	Own	Own	Stewart	Firestone	6	120	Willard	West.	West.	6	Locomobile 38.
Maibohm B.....	5	1260 116	32x3	31x5 1/2	31x5 1/2	31x5 1/2	Falls	6	23.44	1-Stron.	Vacuum	B. and B.	Mechanics	Peru	Jacox	Stewart	Stanweld	6	80	Willard	Wagner	Wagner	A-K.	6	Maibohm B.
Marmon 34.....	7	3950	30x33	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	33.75	Stron.	Gravity	Own	Own	Spicer	Own	Own	Stewart	Firestone	6	120	Pres.	Bijur	Bosch	6	Marmon 34.	
Maxwell 25.....	5	895 108	32x3 1/2	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	21.03	1-John.	Vacuum	Own	Own	Own	Own	Own	Warner	Hayes	12	35	Pres.	S-H.	A-K.	12	Maxwell 25.	
McFarlan 127.....	7	4300 136	35x5	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	48.60	1 1/4-Stron.	Vacuum	B. and B.	B-L	Spicer	Timken	Genmer	Stewart	Firestone	6	90	Willard	West.	West.	6	McFarlan 127.	
Mercer Series 4.....	6	4500 132	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	22.50	1 1/4-Ball	Vacuum	Own	Own	Spicer	Own	Own	Stewart	Firestone	6	100	Willard	Remy	Remy	6	Mercer Series 4.	
Mitchell E-40.....	5	120	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	25.35	1-Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Firestone	6	100	Willard	West.	West.	6	Mitchell E-40.	
Moline-Knight L.....	5	2000 117	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	22.50	1 1/4-Scheb.	Vacuum	B. and B.	Warner	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	Wagner	A-L.	Conn.	6	Moline-Knight L.
Moline-Knight G.....	7	2500 122	35x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	25.00	1 1/4-Scheb.	Vacuum	Own	Warner	Timken	Jacox	Stewart	Firestone	6	100	Willard	Wagner	A-L.	Conn.	6	Moline-Knight G.
Moon 6-66.....	7	2500 125	35x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	29.40	1-Ray.	Vacuum	B. and B.	Warner	.....	Timken	Warner	Stewart	Firestone	6	110	Exide	Delco	Delco	6	Moon 6-66.
Moon 6-36.....	5	1485 114	32x3	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	19.84	1-Tillot.	Gravity	Dedloff	Own	Own	Own	Warner	Stewart	Firestone	6	80	Exide	Wagner	Wagner	Delco	6	Moon 6-36.
Moore 30.....	5	1045 106	30x3	31x5 1/2	31x5 1/2	31x5 1/2	G. B. & S.	4	22.50	1-K. D.	Gravity	.....	G-L	.....	Peru	Warner	Stewart	Firestone	6	80	Willard	A-L.	A-L.	6	Moore 30.
Nash 681.....	5	121	33x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	25.35	1 1/4-Mar.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Firestone	6	100	Willard	Delco	Delco	6	Nash 681.	
Nash 682.....	7	127	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	25.35	1 1/4-Mar.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Firestone	6	100	Willard	Delco	Delco	6	Nash 682.	
National Hy. 6.....	7	2450 128	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Cont.	6	29.40	1-Ray.	Vacuum	Own	Muncie	Spicer	Col.	Warner	Stewart	Firestone	6	110	Pres.	West.	West.	6	National Hy. 6.	
National Hy. 12.....	7	3050 128	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	12	39.68	1 1/4-Ray.	Vacuum	Own	Own	Spicer	Col.	Warner	Stewart	Firestone	6	110	Pres.	Bijur	Delco	6	National Hy. 12.	
Oakland 34-B.....	5	1185 112	32x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	6	18.99	1-Mar.	Vacuum	North.	Warner	Mechanics	West-Mott	Jacox	Stewart	Firestone	6	85	Pres.	Remy	Remy	6	Oakland 34-B.	
Oldsmobile 37-A.....	5	1295 112	32x4	31x5 1/2	31x5 1/2	31x5 1/2	North.	6	18.99	1 1/4-John.	Vacuum	North.	Warner	.....	West-Mott	North.	Stewart	Firestone	6	80	U. S. L.	Remy	Remy	6	Oldsmobile 37-A.
Oldsmobile 45-A.....	7	1700 120	34x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	8	26.45	1 1/4-Ball	Vacuum	Own	North.	.....	West-Mott	Jacox	Stewart	Firestone	6	100	Exide	Delco	Delco	6	Oldsmobile 45-A.
Olympian 45.....	5	1240 112	32x3	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	16.90	1 1/4-Stron.	Vacuum	B. and B.	Own	Own	Peru	Warner	Stewart	Firestone	6	75	U. S. L.	A-L.	A-L.	6	Olympian 45.	
Overland 90.....	5	985 106	31x4	31x5 1/2	31x5 1/2	31x5 1/2	Own	4	18.23	1-Tillot.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	6	75	U. S. L.	A-L.	A-L.	6	Overland 90.	
Owen Magnetic O-36.....	7	4200	35x5	31x5 1/2	31x5 1/2	31x5 1/2	Buda	6	25.35	Zen.	Vacuum	none	Own	Own	Amer.	Own	Stewart	Firestone	6	80	Willard	Own	Bosch	24	Owen Magnetic O-36.	

Engines—Ruten, Rutenber; Cont., Continental; Weid., Weidely; North, Northway; H.S., Herschell-Spillman; Lyco, Lycoming; D-Lyco, Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-Mof., Teetor-McFarlan; S., Monson or Duesenberg; R. & V., Root & Vandervoort. Carburetor—Stron, Stronberg; Zen., Zenita; Ray, Rayfield; John, Johnson; Mar., Marvel; Sund, Sundman; Siew, Stewart; H-K, Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillet, Tilletson; Johns, Johnston. Generator and Motor—A-L, Auto-Lite; West., Westinghouse or Auto-Lite; W-L, Westinghouse or Auto-Lite; Dyn., Dyneto; N. E., North East; L-N, Leese-Neville; A-C, Allis-Chalmers; S-N, Spittorf; S-N, Simms-Huff; G. & D., Gray & Davis. Ignition—A-K, Atwater-Kent; Conn., Connecticut; Eise, Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W, Bosch-Westinghouse; Split., Splitdorf. Gearset—G-L, Grant-Lee; North., Northway; B-L, Brown-Lipe. Rear Axle—Col., Columbus; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. Universal—Hart, Harford; Ther-H., Thermo-Hardy; U. M. Co., Universal Machine Co. Speedometer—J-Man., John-Manville; V-Sicklen, Van Sicklen. Tire—

Motor Age Monthly Passenger Car Specification Tables—Concluded

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carburetor	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltage	Name and Model
Packard 3-25	7	4800	35x5	35x5	Goodyear	3x5	Own	12	13.20	Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-25
Packard 3-35	7	5150	35x5	35x5	Goodyear	3x5	Own	12	13.20	Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-35
Paige 6-35	7	2060	127 3/4	34x4 1/2	optional	3 1/2 x 5 1/2	Cont.	6	29.40	1 1/4 - Ray.	Vacuum	B. and B.	Own	Spicer	Salisbury	Jacox	.....	.....	6	108.4	Willard	Remy	Remy	6	Paige 6-35
Paige 6-40	5	1555	117 3/4	33x4 1/2	optional	3 1/2 x 5	Ruten.	6	23.44	1 - Strom.	Gravity	B. and B.	Own	Spicer	Salisbury	Jacox	.....	.....	6	108.4	Willard	G. & D.	G. & D.	6	Paige 6-40
Paterson 6-48	7	1625	120 3/4	33x4 1/2	Goodyear	3 1/2 x 4 1/2	Cont.	6	25.35	1 1/2 - Strom.	Vacuum	B. and B.	Own	Spicer	Hess	Jacox	.....	.....	6	108.4	Willard	Delco	Delco	6	Paterson 6-48
Peerless Series 4	7	125	125 3/4	33x4 1/2	Goodyear	3 1/2 x 5	Own	8	33.80	Ball	Vacuum	Own	Own	Spicer	Timken	12	125	Willard	A-L	A-K	6	Peerless Series 4
Phaiana L.	7	5000	128 3/4	32x4 1/2	U. S.	3 1/2 x 5	Own	4	24.70	1 1/2 - H. & N.	Vacuum	Own	Own	Spicer	Amer.	Own	6	Willard	W-L	W-L	Bosch	6	Phaiana L.
Piedmont	5	1095	114 3/4	32x3 1/2	3 1/2 x 5 1/2	Own	4	19.60	Carter	6	Willard	6	Piedmont
Piedmont 6-40	7	1545	120 3/4	32x4 1/2	Goodyear	3 1/2 x 4 1/2	Cont.	6	25.35	Zen.	Pressure	B. and B.	Own	.....	Timken	.....	.....	.....	6-8	135	.....	West.	West.	6	Piedmont 6-40
Pierce-Arrow 48	7	6500	142 3/4	33x5 1/2	Goodyear	3 1/2 x 5 1/2	Cont.	6	25.35	Zen.	Pressure	B. and B.	Own	.....	Timken	.....	.....	.....	6-8	135	.....	West.	West.	6	Pierce-Arrow 48
Pilot	7	119	32x4	Miller	.....	3 1/2 x 5	Tector	6	23.44	1 1/4 - Tillot.	Vacuum	B. and B.	Own	Hart.	Hess	C. A. S.	.....	.....	6	.....	Pres.	Delco	Delco	6	Pilot
Premier 6-C	7	2585	125 3/4	32x4 1/2	Firestone	3 3/8 x 5 1/2	Own	6	27.34	1 1/4 - Johns.	Vacuum	B. and B.	Own	Spicer	Timken	Warner	.....	.....	6	123.5	Willard	Delco	Delco	6	Premier 6-C
Reo T.	5	120	34x4	U. S.	.....	4 1/2 x 4 1/2	Own	4	27.23	1 - John.	Vacuum	Own	Own	Own	Own	Own	.....	.....	6	108.5	Willard	Remy	Remy	6	Reo T.
Revere	7	385	131 3/4	32x4 1/2	optional	4 3/8 x 6	*	4	30.63	1 1/4 - Strom.	Vacuum	B-L	Own	.....	Tim-Ball	.....	.....	.....	6	120	Willard	N. E.	N. E.	6	Revere
Roamer 6-54	7	128	32x4	Goodyear	.....	3 1/2 x 5 1/4	Cont.	6	29.40	1 1/4 - Strom.	Vacuum	B. and B.	Own	Arvace	Hess	Jacox	.....	.....	6	115	Willard	Bijur	Bijur	6	Roamer 6-54
Saxon Y-18	5	1195	112 3/4	32x3 1/2	Goodyear	2 7/8 x 4 1/2	Cont.	6	19.84	1 - Strom.	Vacuum	Own	Own	Spicer	Timken	Warner	.....	.....	6	60	Pres.	Wagner	Wagner	6	Saxon Y-18
Scripter-Booth 6-39	5	1385	112 3/4	32x4	Goodyear	2 1/2 x 4 1/2	North.	6	25.50	1 - Mar.	Vacuum	North.	Own	Warner	West-Mott	J. C. W.	.....	.....	6	80	Pres.	Remy	Remy	6	Scripter-Booth 6-39
Seneca H.	5	990	102 3/4	30x3 1/2	optional	3 1/2 x 4 1/2	LeRo	4	15.63	1 - Scheb.	Vacuum	Det.	Own	N. M. Co.	Adams	Ditweiler	.....	.....	6	88	Willard	A-C	A-C	6	Seneca H.
Standard G	7	2750	127 3/4	34x4 1/2	Firestone	3 1/2 x 5	H-S	8	33.80	1 1/4 - Zen.	Vacuum	B. and B.	Own	Spicer	Timken	Timken	.....	.....	6	162	Willard	West.	West.	6	Standard G
Stearns SKL-4	5	2100	125 3/4	32x4 1/2	Goodyear	3 1/2 x 5 1/2	Own	4	22.50	1 1/2 - Strom.	Vacuum	Own	Own	Spicer	Own	Own	.....	.....	12	75	Willard	Remy	Remy	12	Stearns SKL-4
Stevens 74-76	6	1850	118 3/4	32x4	optional	3 1/2 x 4 1/2	R. & V.	6	36.04	1 1/2 - Ball	Vacuum	Own	Own	Spicer	Hess	Gemmer	.....	.....	6	90	Willard	Delco	Delco	6	Stevens 74-76
Studebaker EG	7	1985	126 3/4	33x4 1/2	Goodyear	3 1/2 x 5	Own	6	36.04	1 1/2 - Ball	Vacuum	Own	Own	Spicer	Own	Own	.....	.....	6	80	Willard	Wagner	Wagner	7	Studebaker EG
Studebaker EH	5	1685	119 3/4	32x4	Goodyear	3 1/2 x 5	Own	6	29.40	1 1/2 - Ball	Vacuum	Own	Own	Spicer	Own	Own	.....	.....	6	80	Willard	Wagner	Wagner	6	Studebaker EH
Studebaker SH	5	1125	112 3/4	32x3 1/2	Goodyear	3 1/2 x 5	Own	4	19.60	1 1/4 - Scheb.	Vacuum	Own	Own	Spicer	Own	Own	.....	.....	6	80	Willard	Wagner	Wagner	7	Studebaker SH
Stutz G.	7	130	32x4 1/2	.....	.....	4 3/8 x 6	Own	4	30.63	Strom.	Pressure	Own	Own	Own	Own	Gemmer	.....	.....	12	.....	Willard	Remy	Remy	.....	Stutz G.
Templar 445	5	2185	118 3/4	32x4	.....	3 3/8 x 5 1/2	Own	4	18.23	1 1/4 - Zen.	Vacuum	B. and B.	Own	Hardy	American	Jacox	.....	.....	6	100	Col.	Remy	Remy	6	Templar 445
Velle 38	5	1540	115 3/4	32x4	Goodyear	3 1/2 x 4 1/2	Cont.	6	25.35	1 1/4 - Ray.	Vacuum	B. and B.	Own	Arvace	Timken	Gemmer	.....	.....	6	105	Willard	Remy	Remy	6	Velle 38
Vernon 819	5	1250	115 3/4	31x4	optional	2 7/8 x 4	Own	8	22.05	1 - Own	Vacuum	Own	Own	.....	Timken	.....	.....	.....	6	25	Pres.	W-L	W-L	6	Vernon 819
Vernon	5	1250	115 3/4	31x4	optional	2 7/8 x 4	Own	4	15.63	1 - Own	Gravity	Own	Own	.....	Own	.....	.....	.....	12	37.5	Pres.	W-L	W-L	12	Vernon
Westcott S-18A	7	2500	125 3/4	32x4 1/2	Firestone	3 3/8 x 5 1/2	Cont.	6	29.40	1 1/4 - Ray.	Vacuum	B-L, Warn.	Own	Spicer	Timken	Gemmer	.....	.....	6	109.8	Willard	Delco	Delco	6	Westcott S-18A
Willys-Knight 88-4	7	1725	121 3/4	34x4 1/2	.....	4 1/2 x 4 1/2	Own	4	27.23	1 1/4 - Tillot.	Vacuum	Own	Own	Spicer	Own	Own	.....	.....	6	120	U. S. L.	A-L	A-L	6	Willys-Knight 88-4
Winton 22	7	3850	128 3/4	35x5	optional	4 1/2 x 5 1/2	Own	6	48.60	1 1/4 - Ray.	Vacuum	Own	Own	Spicer	.....	.....	.....	.....	6	110	Willard	Bijur	Bijur	6	Winton 22
Winton 22-A	7	3200	128 3/4	35x5	.....	3 3/8 x 5 1/2	Own	6	33.75	1 1/4 - Ray.	Vacuum	Own	Own	Spicer	Timken	Own	.....	.....	6	100	Willard	Bijur	Bijur	6	Winton 22-A

STEAM CARS

Stanley 735.....	7	3 450	130	35x4	optional	4x5	Own	2	none	none	none	none	Own	Warner	Warner	Firestone	6	Willard	Remy	none	none	6	Stanley 735.
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Engines—Ruten, Rutenb.r. Cont., Continental; Weid, Weidely; North., Northway; H-S, Herschell-Spillman; Lyco, Lycoming; D-Lyco, Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Tector-McFarlan; S., Mouson cr Duesenberg; R. & V., Root & Vandervoort. **Carburetor**—Strom, Stromberg; Zen., Zenith; Ray, Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L, Auto-Lite; West., Westinghouse; S., Westinghouse or Auto-Lite; W-L, Ward Leonard; Dyn., Dyneto; N. E., North East; L-N, Leece-Neville; A-C, Allis-Chalmers; Split., Splitdorf; S-N, Simms-Huf; G. & D., Gray & Davis. **Ignition**—A-K, Atwater-Kent; Conn., Connecticut; Eise., Eissmann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W, Bosch-Westinghouse; Split., Splitdorf. **Gears**—G-L, Grant-Lee; North., Northway; B-L, Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Mansville; V-Sicklen, Van Sicklen. **Tires**—

N. A. D. A. Opposes Return to Night Service

Resolution to Come Up at Annual Meeting

ST. LOUIS, Mo., Dec. 27—The N. A. D. A. is taking a strong stand in opposition to night and Sunday opening on the part of motor car dealers. A resolution advising strongly against extending the business hours will be introduced at the annual meeting. In the meantime, both President F. W. A. Vesper and Business Manager H. G. Moock are throwing their weight against the night business at all opportunities.

President Vesper was in Kansas City recently to attend a meeting there. He said that the spirit of the men he met there was just like that he had found in other places since the signing of the armistice—hopeful and determined.

"I especially recall a conversation with two successful dealers," he said. "They began by saying that there was one thing that they had to thank me and the N. A. D. A. for. That was the advice to diagnose their business, to take stock and find out whether it was a well founded, successful business or not. 'We found that ours was not,' they told me, but they added 'It is now.'"

"Both of these men have proved to themselves that long hours in shop and salesroom were expensive, both as to loss of money and loss of morale in their working forces.

"In most places there are some men who cannot be stopped from working at nights. Just as there is among the Ford men in this city. I have heard that one Ford man here says that he is not going to open his shop at night until he has so much work that the day force cannot do it or until he is convinced that his competitors are taking important business from him by keeping open at night. I am confident that this man will find that he will not lose money by keeping closed at night, but that he will find that his business is becoming better thought of, the quality of work will be better and the profit will show for the day service only.

"Every dealer I have talked to who has gone into the accounts as to night shop work tells me the showing is all for the day work only."

Mr. Moock says: "We are receiving practically no correspondence now about the open night and Sunday proposition. There was some when the armistice was signed, but very little. In all correspondence and in the bulletin we have advised against extending the shop work hours, and none appears to dispute this stand as the sensible one to take.

"We hope to put the annual meeting flatly on record against the old hours. In the meantime, all indications are that the leaders in the trade are content to close early and make more money."

BRAZIL TO HAVE AIR MAIL

Washington, Dec. 27—Brazil soon will have an air mail service between its principal cities. The government has granted several individuals organized into a com-

pany concessions allowing them to establish an airplane mail service to include the various capitals of the states of Brazil. The service must be in operation by 1920. Activities will comprise carrying of small parcels and mail and, with further development of aviation, the carrying of passengers. The number of trips and tariffs will be regulated by the government. All

mail matter transported must be properly stamped and postmarked. Government student aviators must be allowed the use of the planes and hangars of the company. In time of war the government may take over the service, paying a rental based upon the profits of the three-month period preceding but being fully responsible for restitution of all materials taken.

He's a Yank

By Ben S. Bown

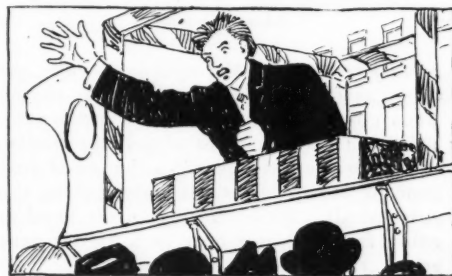
(Although "delayed in transit," the following is nevertheless expressive.—EDITOR.)

He's a Yank!

Brave, strong, gay and eager is he.
And the master of earth, air and sea.

He hits hard and shoots straight
But his motive's not hate—
For love of God's world
Is his banner unfurled.

He works like a son of a gun—
He's out for the skin of the Hun.



He's a Yank!

A sure touch on lever or wheel;
Quick finish of motor or keel.

On the job every minute,
His spirit is in it.
Is he busy? And scrappy?
I'll say he is—happy!

He works like a son of a gun—
He's out for the skin of the Hun.



She's a Yank!

She loves and she prays and she fears.
(O, she weeps—pride and joy in the tears.)

She gives and she sews—
She chauffeurs and hoes.
The counter and bench
Are her hangar and trench.

She works like a son of a gun—
She's out for the skin of the Hun.

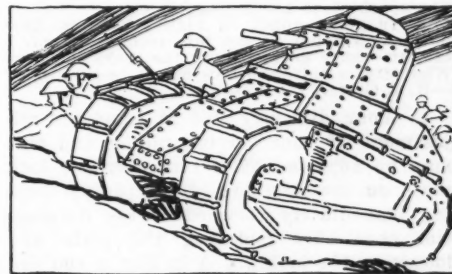


He's a Yank!

At his tasks, on the street, full of zest;
The hardships he scouts with a jest.

He tackles his stunt
For the boys at the front—
The Red Cross and the "Y's"—
And he gives and he buys.

He works like a son of a gun—
He's out for the skin of the Hun.



She's a Yank!

She nurses, scolds, mothers, cajoles;
She joshes; and gladdens their souls.

If her heart, it is sore,
She but labors the more,
What a girl! Let a man
Match her gift if he can.

She works like a son of a gun—
She's out for the skin of the Hun.



The Readers' Clearing House

Questions and Answers

Conducted by B. M. Ikert

Turning Over at High Speed

Q—Would it be possible for a Ford car to turn over with a blowout at 35 m.p.h. or less?
2—Who holds the world's record for speed, and with what car?
3—Give instructions for installing an accelerator on a Ford.—T. D. M., Fennville, Mich.

1—It would be possible but not likely if the driver had a reasonably firm hold on the steering wheel, as he should have at all times, particularly on a Ford. If the road were uneven and a blowout occurred on a front wheel while the car was going 35 m.p.h., or perhaps down to 30 m.p.h., it might tend to suddenly throw the car to one side and thus permit the wheels to cramp or buckle, and then the car would turn over because of the tendency to keep its line of force. Racing cars, with experienced drivers, have skidded and eventually turned over even on smooth tracks or speedways and then when the driver was ever alert.

2—The record for 1 mile straightaway is held by Bob Burman in the Blitz Benz, made at Daytona, Fla., in 1911, his time for the mile being 25.40.

3—You can buy an accelerator for a Ford car and installation instructions will accompany it.

Clashing in Changing Gears

Q—In slowing down, my 1917 Grant six emits a queer noise. This also occurs in going downhill with only a little gas. This noise appears to be near the clutch, which jerks a little. The spark plugs are thoroughly clean.

2—In going uphill on high I have to slow down to 5 m.p.h. to get into second; if not, I cannot change gear without the gears clashing. What causes this, and how can it be overcome?—H. I. Ginter, Du Bois, Pa.

1—Your difficulty lies in improper adjustment of your driving pinion and this may be adjusted after removing the lock plate on the left side of the pinion housing immediately forward of the differential case. By removing the plate and loosening the lock nut A in Fig. 1 you can turn the adjusting cage B to the right to set the pinion C nearer the ring gear D.

It must be remembered that noise of this kind usually is transmitted through the torsion tube, so it would seem to be in the transmission or the clutch. To make a proper adjustment the rear axle should be jacked up on both ends and the back covered plate of the differential removed so you can see when the pinion and the ring gear are correctly meshed. They should come together exactly and they should not exceed 0.008 or 0.010 in. in clearance. If the pinion extends beyond the teeth in the ring gear it will be necessary to back it up and make an adjustment of the ring gear by the adjustment to the left of the gear on the main axle housing. When properly adjusted, it should be possible to run a cigaret paper between the gears without utterly destroying it.

2—It is perfectly proper and absolutely

Miscellaneous

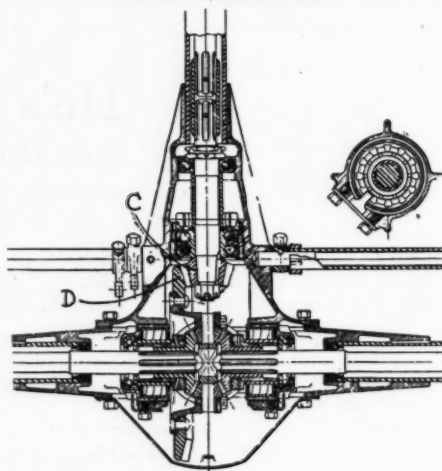


Fig. 1—Rear axle on Grant six, showing adjusting nuts

necessary to slow the speed of your car or to accelerate the speed of the engine when going from a higher to a lower gear. This is largely a matter of driving ability, and experience will permit a change of gear from higher to lower without clashing the gears at all. While driving on the level in going from a lower gear to a higher gear you increase the speed of your car and permit the engine speed to die down by removing your foot from the accelerator at the moment you declutch, so your gears will mesh without clashing. It is just the reverse when going from a higher to a lower gear. In this case, however, the speed of the car naturally slows down and

so the shift should be made easily. The next time you try going from a higher to a lower gear on a hill throw out your clutch and at the same time accelerate the engine and you will find no difficulty in making your gear change.

Shifting Lozier Gears

Q—I have trouble in shifting gears in first and reverse on my Lozier 84. When I start the car and shift the gearshift lever to first speed the gears do not engage readily, but later mesh with a sort of grinding which also occurs on reverse. It does not happen in second or high.
2—Show cross-section of this clutch and gears.—Michael E. Seitz, Cleveland, Ohio.

Either the clutch brake is not properly operating or some of the clutch plates have become buckled; probably the former. You will notice that when you move the clutch pedal forward it operates a yoke and on the ends of the yoke there are arms with blocks which come up against the large bronze thrust bearing plate and thus act as a brake to stop the plate from turning while the gears are being engaged. This is particularly designed to take care of the movement when going into first or reverse gears. Usually when the car is under way, as it is when a shift is made from first to second and so on up, there is little trouble, for the car speed is in excess of the motor speed, which has died down somewhat during the shifting operation, for the foot is taken off the accelerator during the operation.

If the clutch brake is worn to the extent that it cannot be adjusted, it may be a good plan to drill $\frac{3}{8}$ -in. holes in the thrust bearing plate, in line where the clutch brake strikes it, and insert corks, cutting them off so they will protrude perhaps $\frac{1}{4}$ -in. This will assist in the braking of

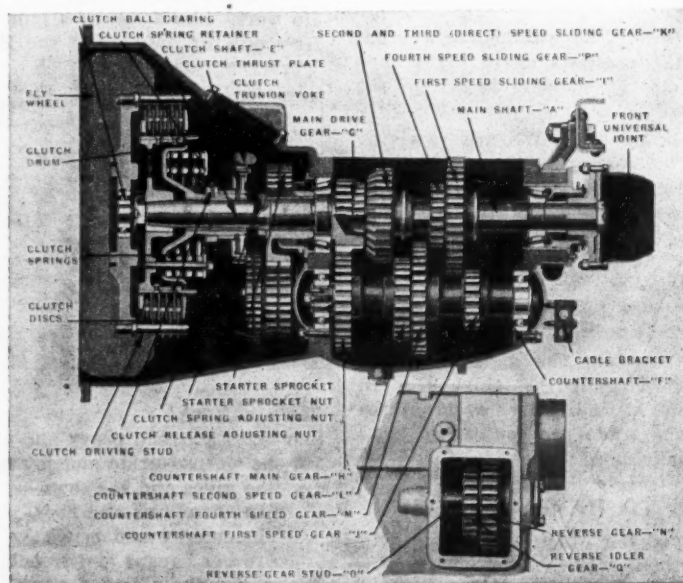


Fig. 2—Sectional view of transmission and clutch on Lozier 84

the plate and should eliminate the trouble.

If this does not remedy the difficulty it will require an inspection of the clutch plates and possibly a renewal of some if they are found warped.

2—This is shown in Fig. 2.

Raising Radiator

Q—I should like to raise the radiator on my 1913 Empire about 3 in. This would leave a fall of 3½ in. from the water intake manifold to the bottom of the radiator. Would this interfere in any way with the water circulation, which is a thermo-syphon system?—Herbert Scull, Ontario, Canada.

The rule concerning the setting of a radiator on a thermo-syphon system is to place the intake and outlet pipes of the radiator midway between the outlet and intake pipes of the water jackets on the cylinders. If the outlet of the radiator is full 3½ in. below the water tap in the cylinders it is likely it will cool sufficiently.

Repairing Cracked Frame

Q—How can a frame be repaired when the channel iron on the left side under driver's seat and also back of the engine block is cracked on the lower edge in two places, allowing the left side to sag considerably? I have bolted a frame of angle iron 2 in. by ¼ in. by 3 ft., using 5/16-in. bolts, but there is still some sag in the frame.—H. D. Benhardt, Whitney Point, N. Y.

Putting angle-iron plates under a frame as suggested will not give satisfactory results, particularly when only bolted. There would be enough play between the bolts to cause a sag. What you should have done is to have removed the body, raised the frame at the sag and then fitted the plates snugly on the inside of the frame and riveted them. The extreme ends of the frame could have been held down by placing pieces of 2-by-4-in. scantling on them, with the other ends against the ceiling. Then a jack under the frame at the break would have raised that portion, say, ¼ in. In this position the plates should have been set and riveted. Then when the jack and scantlings were removed and the body placed on the frame it would have sagged a little, just about enough to bring it into line.

Putting a truss under the frame will be far better and will make the frame safe for the life of the car. It will not be seen, for the apron will hide it, and some very fine cars have been built this way. In fact, the Rolls-Royce car comes from the factory with a truss under each side. If you do this, put a truss under each side and then feel safe.

A sketch is shown in Fig. 3 that will help you. You do not state what make of car you have, but it is safe to use ¾-in. or ⅝-in. steel rod for the purpose. The rod should extend under as much of the frame as possible, 5 or 6 ft., at least, in length. The ends can be flattened so they are about ¼-in. thick and this will make width enough to stand the rivet holes. Immediately under the point of sag or break place a trunnion similar in design to that shown, or even a square metal block will do if you can bolt it through the frame to hold it in place and provide a groove on the under side so the rod will not jump out.

The better way would be to have the trunnion so arranged that the rod passes through an eye, and the base can be extended so it can be riveted to the frame. On one side of the trunnion interpose a

TO assist readers in obtaining as a unit all information contained in this department on a certain subject MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

MISCELLANEOUS

T. D. M. Fennville, Mich.
H. I. Ginter Du Bois, Pa.
Michael E. Seitz Cleveland, Ohio
Herbert Scull Ontario, Canada
N. D. Benghardy Whitney Point, N. Y.
Barney Jack Cleveland, Ohio
R. L. Stout Miami Station, Mo.
C. E. Streed Minneapolis, Minn.
Roger Shaw
..... Hastings-on-the-Hudson, N. Y.
I. J. Calkins Kinston, N. C.
Howard T. Dimick Shreveport, La.
Ralph Beers Detroit

ENGINES

L. V. Jones Georgetown, Ill.
Charles A. Dalstrom Chicago
John M. Goplernd Osage, Iowa
E. R. Walker Waco, Tex.
G. L. Farrell, Pa.
Peter Asquin Chicago

THE ELECTRIC SYSTEM

L. R. Denison Hazelton, Kan.
W. X. F. Metamora, Ohio
H. J. Johnson Davenport, Iowa
L. Boddeker Galveston, Tex.
J. S. Baldwin Newark, N. J.
G. L. Farrell, Pa.
Theodore McClintock Kansas City, Mo.
G. A. Swanson Craig, Neb.
C. G. Wallace Taylor, Ariz.
J. A. Phillips Butte, Mont.

CARBURETION

A. W. Luther Grantsburg, Wis.
W. L. Brown McPherson, Kan.
Reader New Ulm, Minn.
G. L. Farrell, Pa.

No communication without the writer's name and address will be answered in these columns.

turnbuckle, having a right-hand thread on one end and a left-hand thread on the other. With this you can draw up as rigidly as desired, and after the car has been used a while it can be drawn up again, for some sag naturally will result because the rod, threads, rivets, etc., will stretch a little. After the second turning up you will never have trouble. Either two locknuts or a cotter pin should be used to stop the turnbuckle from turning and loosening the structure.

Kind of Bearings

Q—Are bronze bearings satisfactory for both the crankshaft and connecting rod on a Ford? Some say they are too hard and will cut ridges. Will bronze cast and die bearings give good service in this engine?—Barney Jak, Cleveland, Ohio.

You probably will find more satisfaction with the use of die-cast bearings, which can be obtained from any bearing maker, because they make a specialty of furnishing these pieces for the Ford car. They are easily fitted. We have never heard this claim advanced before.

Racing Record and Data

Q—Which is most advisable, to have bearings burned in or scraped in? Which do you recommend for racing, and why?

2—What is the world's record for 1 mile straightaway?

3—What is the bore and stroke of the Packard

driven by Rader which went over 130 m.p.h. at Sheephead Bay? Of de Palma's Packard?—C. E. Streed, Minneapolis, Minn.

1—Scraping bearings is the only way to bring results because it leaves nothing to be taken for granted; it is positive. There are bearings made wherein "running in" is said to finish them satisfactorily and this might be done for ordinary work. The fact that de Palma, Resta and all the other racing men scrape in the bearings on their cars is sufficient answer as to the merits of this procedure.

2—Bob Burman is credited with the mile straightaway record, made at Daytona, Fla., April 23, 1911, in the Benz, the time being 25.40.

3—Rader's Packard twelve-cylinder had a bore of 4 in. and a stroke of 6 in., giving a piston displacement of 904.8 cu. in. De Palma's twelve-cylinder Packard had a bore of 2½ in. and a stroke of 4½ in., making the piston displacement 299.2 cu. in.

Racing Information

Q—How many of the drivers in the Harkness Trophy, Sept. 22, 1917, finished the 100 miles, and in what order? What were the numbers of the cars in the race?—Roger Shaw, Hastings-on-the-Hudson, N. Y.

1—The order of finish in the Harkness trophy race of the date mentioned was as follows, with time:

No.	Car	Driver	Time
54	Frontenac	Louis Chevrolet	54:20.98
4	Packard	Ralph de Palma	56:18.40
45	Duesenberg	E. A. Hearne	56:41.15
9	Frontenac	Ralph Mulford	56:41.50
14	Hudson	Ira Vail	56:41.87

There were other cars running when Vail finished, but as there were only five prizes the race was officially terminated after the finish of the fifth car, and no record was made of the other cars.

Oil as Anti-Freeze

Q—Would 3-in-1 or an oil of equal merit make a good anti-freeze? I expect it is expensive, but I believe it would be safe.—R. L. Stout, Miami Station, Mo.

It would be expensive. Any cheaper oil would do as well, but all ruin the loose connections in a short time.

Types of Live Axles

Q—What are the live axles of a motor car?—I. J. Calkins, Kinston, N. C.

There are two kinds of axles used in motor car and motor truck construction—the live and the dead—and there are three kinds of live axles—semi-floating, three-quarter floating and full floating. The front axle may be termed of the dead type and also the rear axles used, for instance, where chain drive is employed. Here, it will be seen, the axle does not move, the wheels rotating on the axle ends, being driven by chains.

All live axles revolve with the rear wheels and are made in two sections, with the inner ends set into the differential and

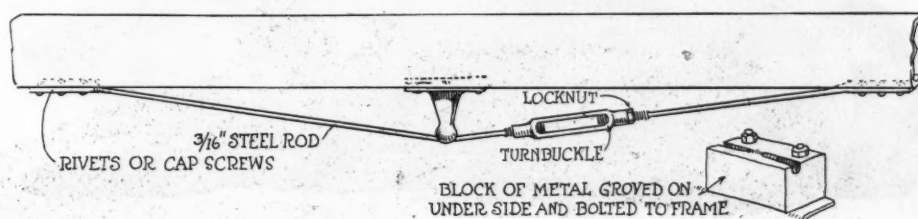


Fig. 3—Suggestion for repairing frame when channel iron becomes cracked

the outer ends driving the wheels. In any of these cases the axle is within the housing that extends either way from the differential housing. Fig. 4 gives a good idea of the difference in the three types. In the first figure is the semi-floating or fixed hub type wherein the axles turn within the housing and the outer ends are fixed in the ends of the hubs by keys to permit the shaft to drive the wheel. At the same time the axle carries the weight of the car through the bearing between the shaft and the housing.

In the three-quarter floating type the construction is a little different, the housing extending into the hubs but the ends of the driving shafts are connected rigidly by flanges with the wheels so that the shafts take most of the bending stresses and all of the driving strains, or torque.

The full floating axle is shown last and in this only the driving strains are carried by the axle proper, the load of the car and all twisting and bending stresses being taken by the housing, in which the axle floats but does not come in direct contact with the housing. The two parts of the drive axles may be removed entirely and the car can be towed, for instance, without their presence.

Hexagon Cellular Radiator

Q—Is the Harrison hexagon cellular radiator the original and, if so, on what make of car was it first used?

2—On what cars is this used at present?—Howard T. Dimick, Shreveport, La.

1—The Harrison hexagon cellular radiator is not the original cellular radiator, but it is the original cellular radiator having a hexagon form of air cell. It was used first on the Regal car and also on a Federal truck.

2—At the present time the Harrison hexagon cellular radiators are being used as standard equipment on the Chandler, Columbia, Chevrolet, Dort, Hudson, Mitchell, Oldsmobile, Peerless, Scripps-Booth, Stutz and Winton.

Chevrolet's Racer

Q—Show photo of Louis Chevrolet's racer.—Ralph Beers, Detroit.

This is shown in Fig. 5.

Engines

Removing Engine from Car

Q—The starter has broken two teeth off the flywheel on my Willys-Knight SS-4. Can I put on a new flywheel without lifting the engine from the frame? How can this be done?—L. V. Jones, Georgetown, Ill.

It will not be practical to remove the flywheel from the Willys-Knight engine

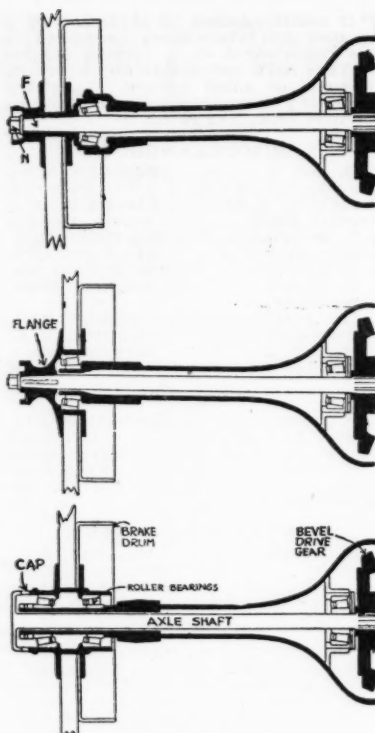


Fig. 4—Difference in three types of live axles, semi-floating, three-quarter-floating and full-floating

without removing the engine from the frame and, besides, you will make a more satisfactory job by having it out, where all parts can be accessible. It is not such a task as might be imagined, but the principal thing to observe will be in having the engine lined up carefully after it is put back into place. If any shims are used to line up the engine, these should be noted carefully so they may be replaced correctly.

You will have to disconnect the gasoline feed pipe, exhaust manifold, carbureter and spark control linkages, remove the radiator entirely and uncouple the shaft at the universal joint at the cross member of the frame. The latter will let you drop the front end of the driveshaft and housing. This is accomplished by taking out the bolts that are in the two ends of the yoke, removing the cover of the universal joint and slipping out the sliding blocks. Then the universal will come apart.

Two arms at the back of the engine hold the base to the frame, and there is another under the front end, where it rests on a cross member. These bolts must be removed, of course. You will have to provide some sort of block and tackle or differential hoist to lift the engine, for it

would not be possible for even two strong men to handle it. A hitch can be made under the engine and brought together at the top of the cylinders to keep the engine upright and in practical balance to be easily handled and so it can be swung around and moved slightly forward and back.

When the engine has been removed it should be placed upon some sort of sawhorse so the flywheel will extend over the end to permit getting at the back side of the flywheel. A substantial box will do if it is about the right size. This easily can be determined once the engine is out and ready for setting on the box.

You probably also will have to remove the brake and clutch levers, but the method of procedure will be seen when the work of taking the parts off is commenced.

The flywheel is keyed to the shaft and bolted to the flange on the end of the crankshaft, and by removing the nuts on the back side of the flywheel a sharp blow with a hammer will start it easily. In putting on the new flywheel there will be little difficulty, but you will have to use extreme care in lining up the starter, so it works freely yet is snugly fitted. It is more than likely misalignment of the starter has caused the teeth on the flywheel to give way.

Steam versus Gasoline

Q—What horsepower gasoline engine develops as much power as a 15-hp. steam engine?—Charles A. Dalstrom, Chicago.

A 15-hp. engine. While this probably is not the answer you expected or desired, it is, nevertheless, literally true. You refer to a gasoline engine, of course. A steam engine has a flexible power derived from steam pressure and that must be taken into consideration when estimating power. Crankshaft velocity, within certain limits, denotes the power of a gasoline engine, and a fixed maximum power may be derived from two or more engines of varying sizes, much depending upon design, type, valve setting, thermal efficiency, etc. A steam engine with several hundred pounds of pressure back of it is capable of exerting terrific power until the high pressure is wasted. A gasoline engine turned to the efficient maximum number of revolutions will exert that power indefinitely.

Methods of Removing Carbon

Q—Is the chain system satisfactory for removing carbon? Describe method.

2—Is there any way to make my 1918 Oakland consume less oil? It uses about 1 qt. to 75 miles, fouling the plugs every 50 miles or so.—John M. Goplernd, Osage, Iowa.

1—Using a chain to remove carbon may or may not work successfully, as there is danger in a small piece of metal leaving the chain and becoming lodged so as to score the cylinder walls if not properly made. There are chains on the market designed for the purpose and which are effective. It cannot naturally be as effective as more modern methods because it cannot reach all crevices and corners. The method merely consists of a chain put into the combustion chamber and permitted to remain there working with the action of the piston. The most thorough method is scraping.

The most modern way to remove carbon is to have it burned out by oxygen, which effectively does the work. Some relief can

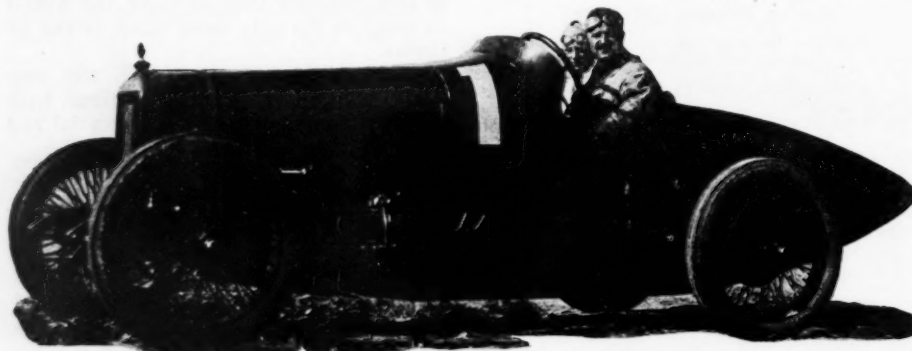


Fig. 5—Side view of Louis Chevrolet's Frontenac

come by the water method. By running the engine at fairly good speed, water may be generously dropped into the air intake of the carburetor and permitted to enter the combustion chamber, thereby dissolving the carbon deposits. This treatment about once a week will do much to prevent carbon from accumulating in large quantities but if the deposits have been there for any great length of time they should be burned out unless the engine is of the type that can be easily reached with a scraper.

2—This model of engine had pistons containing only two rings, whereas now four are used. The two ring pistons are now being replaced with the four. Two rings permit oil to pass and enter the combustion chamber in greater quantity than is necessary and not only wastes oil but fouls the plugs and valves. It would be advisable for you to send to the factory for a new set of pistons having the four rings on. If you do this it will be necessary to remove the cylinder block and have a micrometer measurement taken of each cylinder so the factory can furnish you with a correct size. These pistons are of aluminum-alloy and are usually given 0.0035 clearance.

Rotary-Valve Engines

Q—On what principle is the Speedwell rotary valve operated? Did this type of valve have any direct bearing on the failure of the Speedwell? Is there any other engine using a rotary valve?

2—Can a rotary valve be maintained compression tight and properly lubricated?

3—With gray-iron cylinder block, would bronze or other alloy reduce friction of the rotary valve materially? Is there any metal that is practically frictionless on gray iron or that might be used with a sleeve of some other metal?

4—During how many degrees on one revolution of the crankshaft is the intake valve usually open the same length of time?

5—What is the area of opening in the Willys-Knight engine for both intake and exhaust valves?—E. R. Walker, Waco, Tex.

1—By referring to Fig. 6 you will have an idea of the principle of the opening and closing of the ports of the Speedwell rotary-valve engine. In this type there are two cylindrical pieces of metal running lengthwise of the engine and on the top thereof, operated by silent chain or through bevel gears and a vertical driveshaft from the crankshaft. In these cylindrical pieces are slots cut through so that at a predetermined time they will come into register with the intake ports and the ports leading into the combustion chamber. These take the places of the ordinary poppet valves; in fact, the slots in the revolving cylinders of metal are the valves and when they come into register with the intake ports the gas is admitted to the combustion chamber and, likewise, the gas is expelled when the exhaust ports come into register with the exhaust outlets.

It is not believed this type of engine had anything to do with abandoning its use;

rather, that came from a change in ownership of the company and its eventual elimination as an economic measure.

So far as known there is no motor car engine in this country that is now using the rotary type of engine.

2—Literally speaking, no; but it must be remembered that no valve of whatever type can be made so it will perfectly maintain compression without considerable attention, for there are too many things working to eliminate it. This is true of the poppet-valve type, which, to be successful, requires constant attention in the way of regrinding, truing up and keeping clean of carbon.

It is true that difficulty was had in keeping the rotary type of valve well lubricated and compression tight, for to make it absolutely tight in fit would prevent lubrication, inasmuch as there would be so little space between the valve and the casing that oil could hardly find its way between. Yet, when a valve had worn it permitted oil to flow between the moving parts and this, in a measure, would tend to aid compression. At one time a slightly tapered valve piece was made, so that by setting it up slightly it would become tighter and would take up all wear, but it was found that it required such delicate adjusting mechanism it would not work successfully in the hands of the ordinary user.

3—Any good grade of bearing metal will serve for bearings for the rotary valve piece, just as it is found adaptable in use for other bearings. It has not been found good practice to use cast-iron to take the

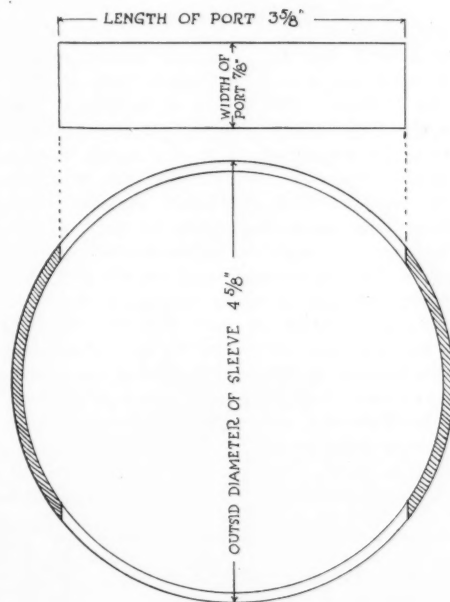


Fig. 7—Dimensions of parts in Willys-Knight sleeve-valve engine

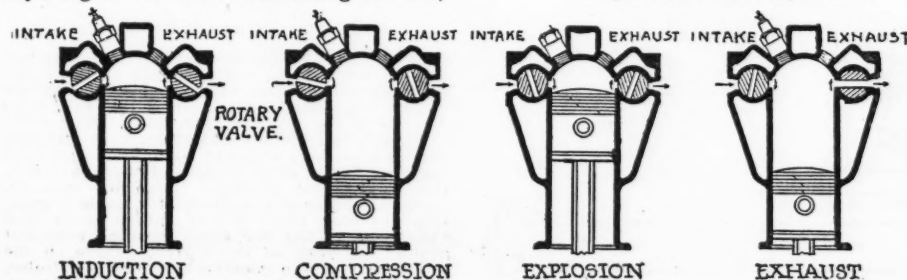


Fig. 6—Operation of valves on the Speedwell type of rotary-valve engine, illustrating principle of the opening and closing of the ports

wear on a moving part except in the case of pistons and cylinders, which, by the way, do not have the same relation to one another as would ordinary bearings that are called upon to carry a heavy load.

4—This would depend on the design of the engine and what the engineer had worked out. The action of the rotary valve can be varied quite as well as the poppet valve and in all probability the time of opening and closing can correspond closely with practice found to have been successful in other types of engines.

5—Approximately 2.67 in. As will be seen by consulting Fig. 7, the outside diameter of the sleeve of the Willys-Knight engine is 4 5/8 in., the ports measure 3 5/8 in. straight across and are 7/8 in. wide, thus working out about 2.67 in. in area. The exhaust and intake ports are placed opposite and each is of similar size.

Horsepower of Chalmers 24

Q—What is the horsepower of the Chalmers Master six, model 24, limousine?

2—What size tire should I use on this car? I have 37 by 5 on it and do not think that is right.—G. L., Farrell, Pa.

1—The N. A. C. C. horsepower is 38.40. The bore and stroke is 4 by 5.5.

2—Tires 37 by 5-in. are correct for this car, as originally marketed. By putting on tires smaller in diameter you will reduce the gear ratio slightly. A car of this size with limousine body requires large tires.

Horsepower of Engines

Q—What type of engine has the Simplex?

2—What horsepower has de Palma's Packard racing car?

3—What do the initials F. P. R. stand for? The name of a motor car?

4—Is the Fiat twelve-cylinder, 700-hp., the most powerful engine?—Peter Asquin, Chicago.

1—The Simplex has its own make of engine, which is an L-head six-cylinder engine.

2—We have not this information.

3—Finley Porter Robertson Co.

4—No, the 900-hp. Fiat four-cylinder is the largest motor car engine.

The Electric System

Bulb Wrongly Focused

Q—One light on my Overland 83 shows a black spot about 10 or 20 ft. ahead. I have tried to adjust the bulb in and out from the sector.—L. R. Denison, Hazelton, Kan.

1—The black spot you speak of is caused by improper focus of the bulb.

Breaker Points on Magneto

Q—Is it possible to use tungsten breaker points on a Bosch NU4 magneto instead of the standard platinum? What causes a magneto of this type to burn out points in about three months of moderate service?—H. J. Johnson, Davenport, Iowa.

While it might be possible to use tungsten breaker points on your Bosch NU4 magneto, it is not advisable and would not give the service and satisfaction that platinum will give. Your trouble lies in the condenser, which in all probability is punctured. It is probable that the remedy lies in having a mica condenser set in. This will require handling by a Bosch service station or branch to attain satisfactory results. MOTOR AGE is advised by the Bosch Magneto Co. that it has a service station in Davenport, Iowa, conducted by A. B. Johnson.

Wiring Dry Cells

Q—Would anything be gained by wiring dry cells series-multiple when used only for ignition where only six cells are used? I understand this

method of wiring would increase the amperage, but not the voltage of electrical pressure.—W. X. F., Metamora, Ohio.

It depends upon what you wish to accomplish. Where the cells are connected in series, that is, zinc to carbon, etc., it gives the voltage of the number of cells used and the amperage of one; if parallel—all the zines connected together and all the carbons together—it gives the voltage of one cell and the amperage of the total number; in series-multiple two sets are used in series but arranged so that both may be used at the same time, in case, for instance, one set gives out or nearly so. This method will give a voltage of five cells—if six are used in each series—and an amperage of two cells.

Wiring of Chalmers

Q—Publish wiring diagram of Chalmers Master six, model 24, limousine.

2—How should a magneto be set before dead center? Should it be set by the mark on the flywheel, M, with spark retarded?—G. L., Farrell, Pa.

1—This is shown in Fig. 8.

2—Yes, retard the spark fully and set the magneto to break when the piston is at top dead center on the compression stroke.

Bulb of Wrong Voltage

Q—I want to change the gas lights to electric lights on my 1911 Cadillac. I have no generator, but I have a 24-volt Willard battery. It burns the bulbs out in less than one hour. What size wire and bulbs should I use?—J. S. Baldwin, Newark, N. J.

1—You are using bulbs of the wrong voltage for the way you have the car wired. Either use 24-volt bulbs or four 6-volt bulbs in series.

Low-tension Magnetos

Q—Explain the difference between the armature of a low-tension magneto and that of a lighting generator?

2—The engine on my Pierce Arrow 38 6-4 refused to stop when the switch was turned off. It was found that the wire which is connected to the terminal on the interrupter cover of the magneto had come loose. How did this cause it?—Theodore McClintock, Kansas City, Mo.

1—A low-tension magneto has a shuttle-type armature, with one winding of copper wire, and gives an alternating current. One end of the wire is grounded to the end of the armature core and the other is insulated. There are, however, inductor types of low-tension magnetos, where the inductors, or rotors, are placed crosswise, giving the same effect as if two shuttle-type armatures were placed crosswise between the permanent magnets. A generator, used for charging, generates a direct current, which is necessary in charging a battery.

This may be of the series-wound, shunt-wound or compound. In any of these cases some of the current from the brushes is carried around the field magnets to assist in energizing them. Usually the armature is of the drum type.

2—The wire mentioned is connected through the ignition switch with the frame of the car, forming a grounded circuit. As a matter of fact, when you turn the ignition switch "on" you break the circuit, causing the current to work through the magneto and plugs. When you turn it to "off" you close this circuit and the current, following lines of least resistance, is grounded through the frame, so that none passes through the magneto and, the current being stopped, the engine stops for lack of spark. You could do away with the switch entirely if desired, and to stop the engine all you would have to do would be to hold a bar of metal or a piece of wire between the terminal on the magneto cover and any metal part of the car. This would divert the current from the magneto.

Lights on Elgin Six

Q—Why should the lights on my 1917 Elgin six burn bright when the engine runs fast and dim when running slowly. They also burn bright when the engine is not running. The battery is in good condition and the ammeter shows charge.

2—I have an Exide battery which is about four and a half years old. The front cell, the one next to the generator, tests 1225, the second 1200 and the third 1100. It does not leak, but the connections are somewhat sulphated. I have cleaned the connections, but the test is the same. The generator shows about 11 amp. charge. Does this need repair? Would you advise an Edison battery for this car?

3—How can the generator output be increased on the Delco, used on the 1915 C37 Buick?—G. A. Swanson, Craig, Neb.

1—In all probability the automatic cut-out remains closed when the speed of the generator has fallen under that required to maintain a voltage higher than that of the battery. The result naturally is that some of the battery current is flowing back into the generator, with the result that a small cable, not being sufficient to carry the load of both the lights and the back flow, will cause the lights to burn dimly. Naturally enough the lights brighten again when the engine is speeded up, for the generator voltage is again increased to equal or exceed that of the battery current.

2—Age and use seem to have depleted this battery and it is, apparently, too old to stand repairing with any degree of success.

3—This can be accomplished by adjusting the third brush, which controls the current output. Immediately under the end of the generator will be found a small

plate, held in place by two screws. These should be loosened slightly to permit the plate to move and then the plate should be moved gradually, but slightly, in the direction in which the armature turns. It will require a little experimenting, but the work can go on until the proper output of current is obtained. Be careful to set the screws tight each time they have been loosened to move the plate. In a sense this can be likened to advancing and retarding the spark, that is, this will give you some idea of what it means.

Clearance for Magnets

Q—What is the proper clearance between Ford magnets and the stationary coil?

2—The circuit breaker on my Cadillac 55 burns out in going $\frac{1}{2}$ mile. What can be the trouble?—C. G. Wallace, Taylor, Ariz.

1—The clearance should be $\frac{3}{16}$ in.

2—Although the question is indefinite, it probably refers to the interrupter in the timer, in which case it means a broken-down condenser or that the points are set too far apart. The contact points should be set to open .00020 in. and no more. It is not likely the relay is meant, for in case of a short-circuit anywhere or if the timer points are in contact the vibrator will give warning as long as the short exists. This would not indicate if the car is running, so it is presumed the question refers to the interrupter.

Transformer for Recharging

Q—I have a small transformer, such as is used in running small electric trains from the light circuit, stepping the voltage down to 20, 15, 10 or 5 as desired. Would it be possible by the use of this transformer to recharge my own motor battery from the light circuit in my garage? Would it act the same as a number of 16- or 32-cp. lamps injected into the circuit between the light socket and the battery poles?—J. A. Phillips, Butte, Mont.

Your scheme will work, provided your electric light supply is from a direct current of 110 volts; otherwise, you will have to have a transformer to change from alternating to direct current. Ascertain from the electric light company the kind of current used, if you do not know, before attempting to use it in charging your battery.

Carburetion

Carburetor on 1915 Grant

Q—I have a Grant 1915 six which has a Mires carburetor, and I cannot get the engine to idle as it should. I think it is the carburetor and am thinking of putting on a Rayfield or some other good carburetor.—A. W. Luther, Grantsburg, Wis.

The 1915 Grant six cars had Mayer carburetors, not Mires, and one of the troubles with this make was that the engine would not idle properly. At present Stromberg is fitted to the Grant car. You probably will get very satisfactory results with either a Rayfield or a Stromberg.

Adjusting Stewart Carburetor

Q—I have a Dodge Brothers 1915 touring car. In cold weather the engine misses on two cylinders, also loads and gallops. I have had the engine overhauled several times this fall, tried new carburetor, ground valves, etc. New cylinder block and pistons and rings were installed this fall. I have a theory that insufficient heat for the mixture after it leaves the carburetor is the cause of the trouble. Invariably upon removal of engine cap or carburetor, pools of gasoline are seen lying in the intake ports, and always when the car stops gasoline runs out around the stem of the butterfly valve on the upper part of the gooseneck of the carburetor. This is a Stewart carburetor with offset neck to go around the end of the generator. I have

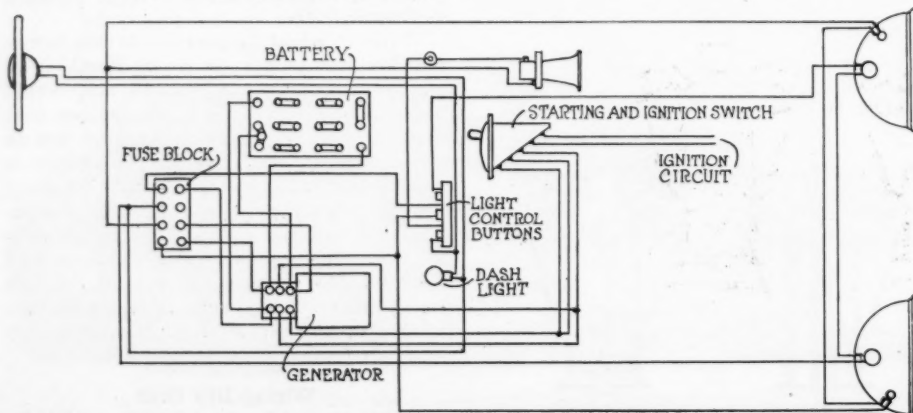


Fig. 8—Wiring diagram of electric system on Chalmers

tried hot air from exhaust to air intake of carbureter without much results.—W. L. Brown, McPherson, Kan.

Apparently this is a case of the carbureter needing adjusting and perhaps a little heat applied through means of attaching a stove to the exhaust pipe and leading it to the air intake of the carbureter. See Fig. 9 and also the answer to Reader in the same connection. Proceed to adjust the carbureter, but before doing so make sure the trouble is there, as it seems to be, however.

Test for an air leak between the carbureter and the cylinder block by applying oil at the carbureter flange when the engine is running and observing whether or not this oil is drawn into the intake passage. Make sure the carbureter gasket is tight to prevent a leak of this nature. If the carbureter does not act properly, take it apart and clean all dirt and sediment from both the float chamber and dash pot chamber so the air valve will slide back and forth easily.

There is but one point of adjustment to the carbureter. This varies the relative height of the metering pin to the opening of the aspirating tube or spray nozzle when the dash control ratchet on the instrument board is in its regular running position. This adjustment is properly made at the factory and should not be changed unless it is known absolutely to be incorrect.

The tapered metering pin is subject to control within fixed limits by means of the

dash control ratchet located on the instrument board, to obtain a rich mixture for starting. Should there be any reason for changing the fixed adjustment of the tapered metering pin, it can be done by turning the stop screw to the right or left as desired. Turning this screw to the right lowers the position of the metering pin and allows more gasoline to be admitted to the spray nozzle, thus enriching the mixture. Turning the screw to the left raises the pin, decreases the supply of gasoline and impoverishes the mixture. Bear in mind that a small part of a turn will make a difference in the amount of gasoline supplied to the carbureter and the action of it. If the carbureter sputters or backfires at high speed the mixture should be given more gasoline. If it loads and pulls unevenly, with the dash control ratchet in the regular running position, at low speeds, the mixture should be given less gasoline.

The engine should be permitted to be thoroughly warmed before the carbureter adjustment is made. Cover the radiator and let the engine run until it is warm. The adjustment should be made so that when the spark is only slightly advanced the engine will idle nicely, with even explosions, and yet should not hesitate to pick up quickly when the throttle is suddenly opened wide. If it will stand this, you may be assured it will respond instantly when the throttle is opened while the spark is fully advanced.

We do not believe you need a new carbureter—not until you have at least gone further with the adjustment, and perhaps added a hot air tube from a stove on the exhaust manifold leading to the air intake of the carbureter.

The fact that gasoline drips from the carbureter when the engine is stopped means an excess of fuel enters the intake pipe and that it condenses. As soon as the engine ceases sucking this through the intake pipe naturally it drips out from the carbureter. The hot air pipe and a just-right adjustment of the carbureter will eliminate this to all but a minor degree.

Adjusting Stewart Carbureter

Q—I have a 1915 Dodge Brothers car, and the carbureter is out of adjustment. In starting the carbureter floods, and the starter will not start the engine. With the crank I can start it easily. The carbureter is a Stewart. Do you think it is a needle valve? The car has been driven about 1400 miles.

2—What kind of oil should be used in the crankcase?—Reader, New Ulm, Tex.

1—Your trouble seems to be in the adjustment of the carbureter and particularly in the metering pin, which apparently permits too rich a mixture. Either a rich or lean mixture will cause overheating and loss of power through slow burning of the charge. See answer to W. L. Brown for correct instructions on adjusting the Stewart carbureter. It is possible your dash control does not allow the metering pin to rise sufficiently to prevent too rich a mixture. If the dash control is not free to release its full extent, it will hold the pin down and thus make a rich mixture at all times, getting worse as the engine heats. Consult Fig. 9 and notice the arrow pointing to the dash control. If the cam on the shaft is set so it will not permit the arm under it to go all the way down, the screw can be loosened and the cam moved slightly to give freedom of movement to the dash control. Otherwise, follow out the instructions given for adjusting the carbureter. If correctly adjusted, you should have no such trouble as indicated.

2—Any medium grade of good lubricating oil will do, we are advised by the Chicago Dodge Brothers representative—Mobiloil, Veedol, Polarine, etc.

Carbureter on Chalmers

Q—I have a Chalmers Master six, model 24, limousine. I put in new rings $\frac{1}{8}$, four to a piston. The valves, rings, timing are all right, but the engine will not pull in high speed up small grade and will not pull up a hill in intermediate and pops back in the carbureter, which is a Rayfield. The carbureter starts to leak when the engine stops, and leaks about a quart of gas each time it stops. I get only 4 m.p.g.—G. L. Farrell, Pa.

1—In all probability the jets in the carbureter have become badly worn and need replacing; in addition, the metering pin may need either regrinding or replacement, as well as the float needle valve. From the fact that you obtain only 4 m.p.g. of fuel it would appear to be a wise investment to send the carbureter to a Rayfield service station or to the factory in Chicago for a complete overhauling. If you do this, give the factory a history of the troubles and state on what car the carbureter is used. Any carbureter nowadays will emit a little gasoline when the engine is stopped. This is the fuel that has condensed, but a few tablespoonfuls should be all that would find its way out; a quart indicates the float valve does not seat.

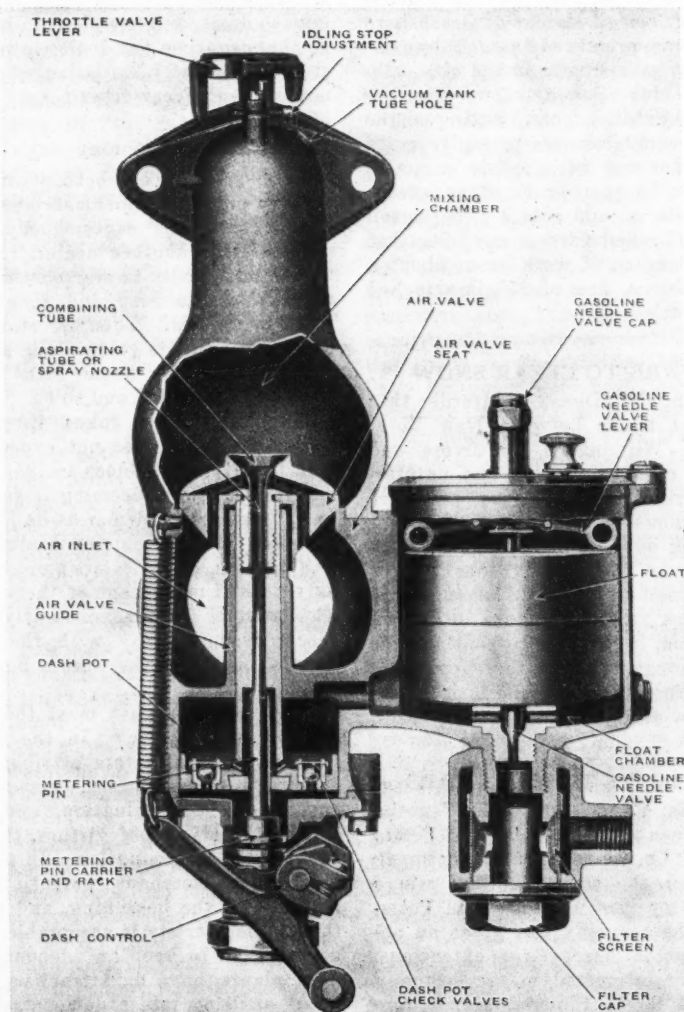


Fig. 9—Stewart carbureter used on 1915 Dodge Brothers car

How Lalley Plants Are Distributed

Nothing Is Left to Chance

WHEN the Lalley company began building farm lighting plants and putting them on the market they perforce took such selling agencies as were in sight. Very early the fact was brought home to them that unless the dealer could visualize the possibilities of the trade and could departmentalize his business so that the light and accessory business could be operated as a separate and distinct department, with a definite plan of operation and with a singleness of purpose, few, if any, could succeed. The salesman of motor cars who attempted to sell electric lighting plants as a side line was comparatively a failure. The alternative at that time was the peddler, too often a man without commercial standing or capital and without merchandising sense—the sewing machine agent type of man. The problem was to educate and develop a selling organization which should have stability, standing and ability and which should make a real business out of the selling of farm lighting plants. The Lalley company began with the distributor.

The country was divided into twenty-five districts. Each district was to be the exclusive territory of some capable distributor with capital and brains and he should be given the sales rights for the Lalley light in his territory under a definite contract. To him the company would look for the development of his district by the establishment and education of local dealers. Care and discrimination were used in the selection of the district distributors. They must be men of large ideas and abundant capital; men competent to plan and direct a sales force; men of broad and comprehensive views and able to conduct big business in a big way.

Lalley Sales Manual

In order that the development of every district should be uniform and in accordance with a general plan, the Lalley company left nothing to chance. A sales manual was prepared by Director of Sales Willis which goes into detail as to the manner in which a district shall be organized and developed. The distributor was instructed to divide his district into blocks of not less than four counties each and not more than ten, the size of the block depending upon density of population and other obvious considerations. Over each block is put a special block salesman whose duty it shall be to appoint and instruct the local dealers, the object being that ultimately there shall be a Lalley merchant in every important trading center in every block, whose local territory shall be that defined as "tributary to his town."

After directing the physical division and development of a block the manual goes on to tell what manner of man the block salesman should be and what he must know and what he must do. The first qualification is that he shall be a sales executive, for actually he is the sales manager for his block. He must know his territory minutely, as to the sales possibilities in it for every dealer, and he must know all there

is to know about the mechanical construction of the Lalley plant and how to install it, how to figure wiring contracts and so on. The manual instructs him as to the equipment he should have, sales manuals, supplies of blanks and literature, maps of territory, analysis of sales possibilities, photograph album, scrap books and camera.

The block salesman, being the connecting link between the distributor and the dealer, has important functions. Upon his judgment in picking men and upon his ability to instruct them and upon his success in inspiring them to effort depends the successful development of business inside his block. He is instructed to work in the following manner:

He begins in the central county in his block, preferably, and selects the principal trading point in that county. This is the key point. By investigation among bankers and other influential business men he selects the future Lalley merchant, preferably a motor car dealer. Him he interests by pointing out the possibilities of the business, making the appeal to his desire

for gain and to his ambition to identify himself in his community as a real merchant. Having secured him, a plant is installed and made ready for demonstrations. The blockman invites in the banker, the local retail implement man and such other local business men as have influence in the community and who will be of service in locating likely prospects. The first demonstration is made to them. The blockman then works on the banker to convince him that it is good business to finance the purchase of a Lalley plant for any farmer who wants to buy.

The blockman shows the banker that a Lalley light and power plant is a permanent installation for the farmer, with a life of ten years or more, and that its annual depreciation is very small. He points out that it enhances the cash value of the farm, makes living conditions better and that it actually is an asset and not a liability. The object is to interest the banker and to secure his cooperation.

The dealer then is shown the necessity of having a plant which can be taken out into the country for demonstration purposes. The blockman is instructed to spend a week or ten days with the dealer, himself selling at least one plant and then having the dealer sell one plant in his presence. In the meantime the dealer is receiving instructions as to installation, the use of his manuals and every other point of his equipment.

Blockman Keeps Moving

After so much has been accomplished at the key point the blockman moves along to the next trading center and repeats the process with another dealer. As soon as the second dealer is started the blockman returns to the first and spends another week with him. Then he starts a third dealer, when he is going along all right, he spends a second week with the second dealer he interested and so on.

Manifestly, this takes time, but the Lalley company does not expect a blockman to develop his block inside of from six months to a year, deeming it far more important that each dealer as he is appointed be made into a producing dealer than it is to appoint a lot of dealers quickly and have only a small percentage of them producing. The manual insists constantly that the blockman must stay with the dealer he selects until he makes him a business man and a producer.

Now, in turn, what must the dealer be in this organization? In the first place, he must possess certain attributes. These essentials are honesty, common sense, energy and determination, and, like the last of the trilogy of virtues, the greatest of these is determination. In addition he must be a merchant, potentially, if not actually, in the beginning, and no man of the peddler variety is acceptable. He must be prepared to keep an adequate stock of light plants, have an attractive showroom which shall contain a demonstration plant and the accessories which will be sold with a light and power plant. He must have a

SUNDAY TRADE HOURS SET

Greensboro, N. C., Dec. 27.—At a meeting of the city commissioners of Greensboro a petition was presented, signed by virtually all the garage men in the city, asking for a blue Sunday law affecting garages, filling stations, etc. Acting on the request, the commissioners promptly made it unlawful for any garage, tire or accessory house to be open on Sundays, except from 8 to 10 a. m. and 6 to 8 p. m. to sell gas, repair a broken part or anything that has the appearance of work on or about a motor vehicle. A fine of \$50 is attached for each violation.

DELAWARE TO CLEAR SNOW

Wilmington, Del., Dec. 27.—In order that motor freight traffic between New York, Philadelphia, Wilmington, Baltimore and Washington may be carried out uninterruptedly during the year the Delaware highway commission has contracted for snow cleaning on that portion of the Lincoln highway in Delaware whenever there is a fall of snow exceeding 3 in. in depth. While portions of this road are in process of construction, it is hoped to continue the work long enough to make the entire road usable very soon. At present it is necessary to follow several detours.

DIRECT DRIVE TO MAKE CARS

Philadelphia, Pa., Dec. 27.—Negotiations have been completed by the Direct Drive Motor Co. to start manufacturing motor cars in the same building where Chadwick motor cars were made in Pottstown, Pa. The company was given an option on 15 acres nearby for extensions. Those actively interested in the company are Thomas R. Burns, Philadelphia; George R. Bidwell, North American Motors Co.; Henry Crowther and J. E. Price.

demonstration plant which he can take into the country and he must have a motor car.

Essential to his success as a merchant is a minute acquaintance with his territory. He must know the number of farms, how many are worked by owners and how many by renters, the approximate value and income of each farm, the estimated worth of the man who works each farm and the character of the crops grown on each farm. He must have his territory analyzed so that he has a mental picture of its total possibilities for trade. He must have a definite plan of operation and he must realize the importance of selling first to the influential farmer in every locality, the farmer whom Mr. Willis designates as the bell-wether. But first of all he must sell himself until he realizes the possibilities of what he has to sell and he must be thoroughly familiar with every detail of the product he sells.

He must realize that the farm light and power business is big enough in possibilities to build upon permanently and he must be so familiar with the fundamental and essential principles of up-to-date, scientific

farming that he shall be able in every instance to see how a light and power plant can be applied to farm conditions as he finds them.

How he is to familiarize himself with all the material provided by the company, how he is to use it and how he shall proceed to develop the latest trade possibilities in his local field Mr. Willis has set forth in detail in the dealer sales manual he has prepared for the instruction and guidance of dealers. This manual the dealer must study assiduously.

Among other things with which the dealer is provided is a prospect list in triplicate. This he fills out as he gathers the names of likely prospects. One copy he keeps in his office as the basis of his office list of prospects; one he sends to the distributor for his district and one goes to the home office of the Lalley company. And here is where the cooperation of the company comes in.

Every prospect from every dealer in the country is kept alive by the company by a series of advertising pamphlets sent out periodically until the prospect buys or be-

comes definitely "dead." In addition to this, the company maintains constantly a national campaign of advertising in farm papers and the like.

Such, very briefly, and touching only the high spots, is the plan now being pursued by the Lalley company to develop a distributing organization of real merchants, and the significant and promising feature of it is that this organization is to be composed for the most part of car dealers.

And it is working. During the year 1918 the Lalley company built and sold something like 1900 lighting plants. Under the plan now being followed for developing distribution this production has grown to 10,000 plants for 1919. As the organization grows the company can see this annual distribution increasing enormously, not alone for its product but also for the product of competing concerns who make a dependable plant. The possibilities of the farm light and power plant, and for the accessories which inevitably will be sold with it, are almost infinite, and it is a business which is being literally handed to the motor car dealer.

A Letter from a Sales Manager

FARGO, N. D.—Editor MOTOR AGE—Adversity is a hard teacher and it behooves those who attend the lectures of this professor of experience to attend and give due heed to its teachings.

This letter is suggested by an article in the house magazine of the Timken people. In this article they spoke of the mistakes of the advertising end of the automobile business, in that all of the posters and general advertising of the trade represented persons of leisure—otherwise called "idle rich"—reposing or driving in the advertised car at either the seashore or in front of some ornate palace of evident luxury.

Thus cultivating the impression in the minds of the general public the idea that "pleasure cars" (would that someone would ordain the sunrise sentence for the use of this phrase) were an attachment of only those who have leisure and money to refrain from work.

Politicians Are Human

Politicians are only human beings, and with this idea firmly implanted in the minds of the people of automobiles being a luxury and with no one to deny it or rush to their defense in time to remove this impression, they proceeded to tax them and tax them hard.

But there are many fields open to the advertising man who will stride from the conventional rut that they have effected in illustrations in the past and show the doctor, the county official, the fire chief, the farmer and so on along a long line of examples where the use of the car would be almost as much missed as the use of the telephone.

But all of that is only introductory to the idea which I wish to bring out.

Manufacturers have also made mistakes in the past aside from those of mechanical detail.

Of course the ideal distributor is one who has "oodles" of money, who will take all the cars that the manufacturer can ship

him in the winter time, pay for them, store them so as to keep the industry moving and thus reduce the overhead for the manufacturer.

Other lines of manufacture consider also the interests of their customers. They have been forced to do so to hold the business.

Automobile manufacturers cannot always get the ideal distributor mentioned above.

They often have from the nature of things put up with bright energetic men who are seeking to make some money which they have not themselves.

The latter class have to take some cars, of course, in the winter. They have to seek assistance from their bankers. Many and many a time such men have sought such assistance, have received it, and from conditions beyond their control have found the goods moving slowly, have asked to have the goods held back, have had their contracts canceled, a new contract made in the same city and thus treated with a total lack of consideration of their efforts to market the line.

Each distributing center has dozens of instances of this kind where the efforts of the distributors themselves have established the goods, made a market for them—goods no matter how good will not sell themselves—only to find some other fellow reaping the benefit of their work, and laughing at them.

Bankers have seen so much of this and business men that they have come to look upon many of the manufacturers as lacking in integrity and common sense and a proper consideration for the value of their trademark.

Until when the Federal Reserve Bank started out to have the automobile business declared a non-essential business and loans on the basis of passenger cars declared non-acceptable for re-discount, and went even further than that and had the Comptroller of the Currency commence to

take it up with national banks and urge that no help be given to the auto business, the result was the country at large shared the thought of the automobile barons being without the pale of consideration.

In many other lines of business, notably fire insurance, the agent who has built up a fine list of expirations is supposed to have an interest in this business, and if the parent company deems it to their best interests to make a change, this interest is considered a basis of compensation to the agent displaced.

There is no manufacturing business that in the end will be a great success that does not take into consideration both the interests of the user and also, it is my contention, the interests of the seller or distributor.

It is the purpose of this letter to draw attention to this abuse of power on the part of the manufacturer and to the price that they have already paid and to what in some future emergency they will pay more heavily if a change is not made.

A Firmer Foundation

When five-year contracts are made, when an agent's right to some return for his organization work is incorporated in his contract, then there will be a firmer foundation laid for more satisfactory banking relations for the small distributor, and he can take cars more freely in the winter months.

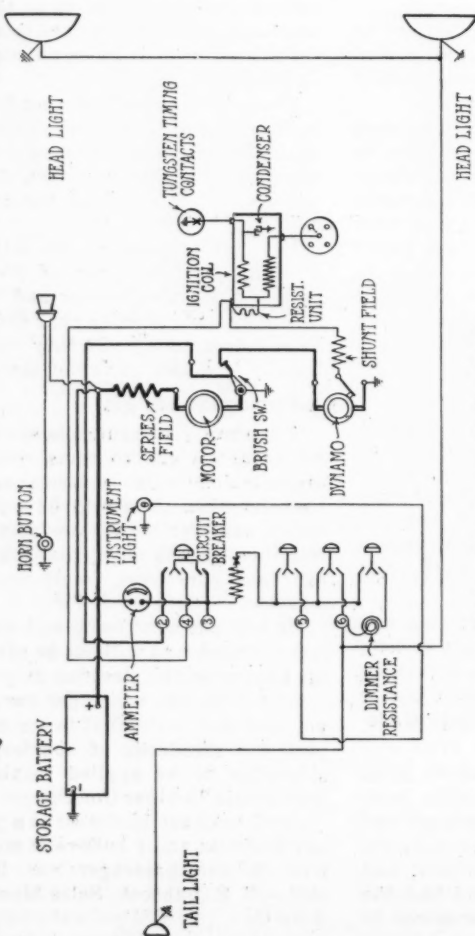
He will put more heart and more expense into his work and will not be afraid to meet his banker on the street as at present.

Of course, the passenger car business is yet new and perhaps it is too much to expect the standards of courtesy and consideration to be applied to this business that obtain in other lines.

Devil take the hindmost is a poor rule in any business and I believe it will be found true in the passenger car business as well.—E. S. Babcock, Sales Manager, Allen Auto Co.

Motor Age Wiring Diagram Chart No. 9

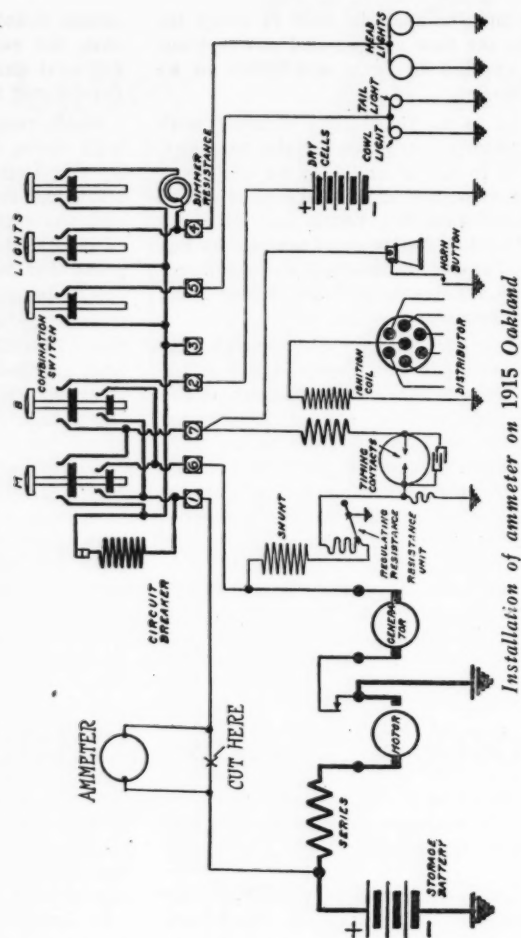
Oakland Models



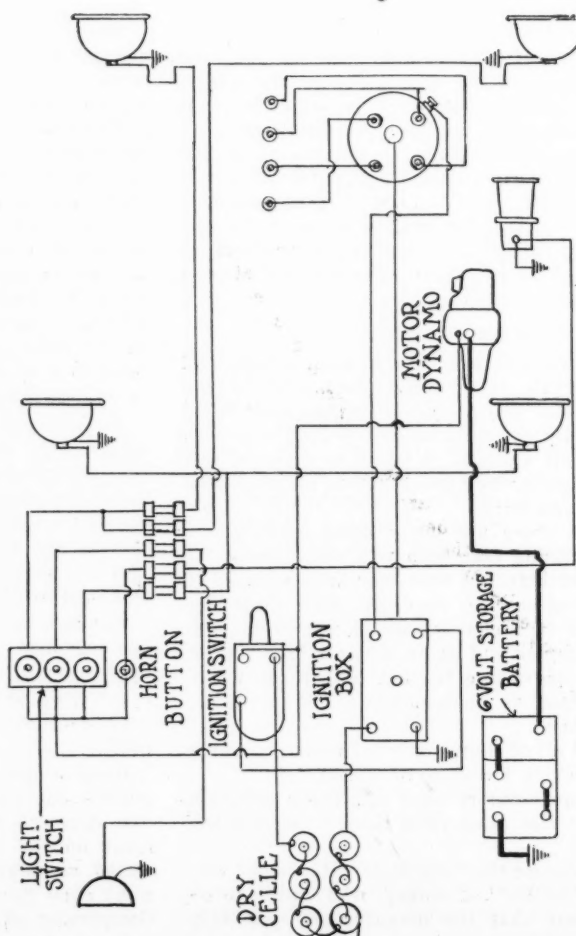
Delco System on Oakland 32

Next Week—Mitchell
Alter—Nov. 14
Buick—Nov. 21
Chevrolet—Nov. 28
Dodge Brothers—Dec. 12

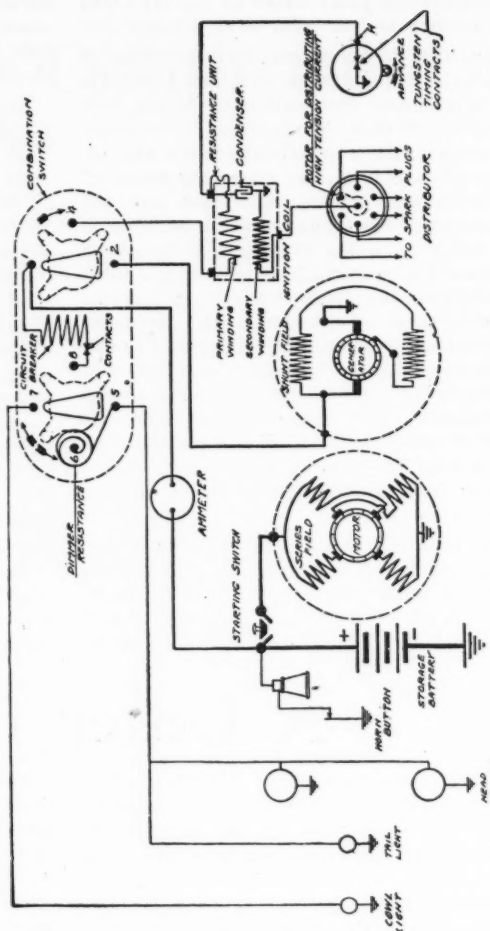
Hudson—Dec. 5
Oakland—Dec. 26
Overland—Nov. 7-14
Scripps-Booth—Dec. 26
Studebaker—Dec. 19



Installation of ammeter on 1915 Oakland



Delco System on the 1913 Oakland



Delco System on Oakland 32B

Lamp Voltages for 1915 and 1914 Cars

Motor Age Maintenance Data Sheet No. 19

One of a series of weekly pages of information valuable to service man and dealer—Save this page

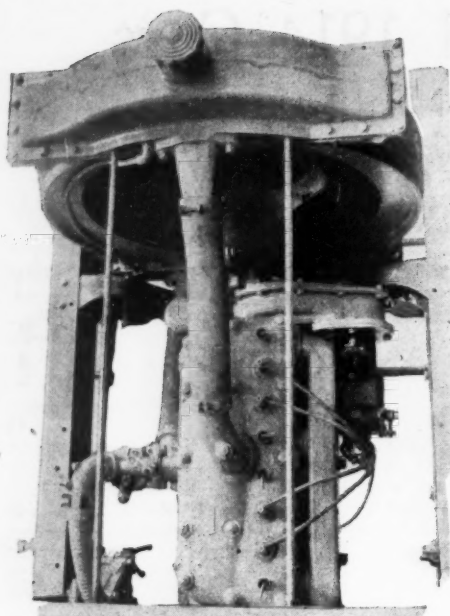
1915 Cars—Concluded

Car and Model	Base contact	Headlights			Sidelights			Taillights			Dashlights		
		Volts	CP.	Amp.	Volts	CP.	Amp.	Volts	CP.	Amp.	Volts	CP.	Amp.
Overland—80, 81 and 82.....	Single	6	16	—	6	4	—	3	2	—	3	2	—
Packard—3-38.....	Double	7	24	—	7	6	—	7	2	—	7	4	—
Packard—5-48.....	Double	7	24	—	7	4	—	7	2	—	7	4	—
Paige—6-46.....	Single	6-8	15	2.5	6-8	4	.75	6-8	2	.4	6-8	2	.4
Pathfinder.....	Single	6	16	2.5	6	4	1	6	2	1	6	4	—
Peerless.....	Single	6.5	15	2.5	7	4	.84	7	2	.42	7	2	.42
Pierce-Arrow—All.....	Single	6-7	21	—	6-7	4	—	6-7	4	—	6-7	4	—
Pilot.....	Double	6	15	—	6	5	—	6	2	2.5	—	—	—
Pratt.....	Single	6	21	2	6	6	2	6	6	1	6	4	1
Premier—All.....	Double	6-8	18	3	—	—	—	6-8	2	.42	6-8	2	.42
Pullman.....	Double	12	16	—	12	8	2.5	12	2	1	—	—	—
R-C-H.....	Double	6	16	3	6	4	1	6	2	.5	—	—	—
Regal.....	Double	6	21	—	6	—	—	6†	2	—	6	2	—
Reo—All.....	Double	6-8	15	3	—	—	—	3-4	2	1	3-4	2	1
Saxon.....	Single	6	15	—	—	—	—	6	2	—	6	2	—
Scripps-Booth.....	Single	14	15	1	14	4	.42	14	2	.26	14*	2	.26
Simplex.....	Single	6	24	4	6	4-6	1	3.5*	2	.5	3.5*	2	.5
Singer.....	Single	6	21	—	6	6	.5	6	2	.5	6	2	.5
Speedwell.....	Double	6	20	3	6	6	1	6	2	.5	6	2	.5
Sphinx.....	Single	6	12	2	6	2	.33	6	2	.33	—	—	—
Spaulding.....	Double	21	21	—	21	4	.19	21	2	.09	21	2	.09
Stearns-Knight—All.....	Single	12	18	1.25	12	4	.42	12	2	.26	12	2	.26
Stevens-Duryea.....	Single	7	21	—	7	4	—	7	4	—	7	2	—
Studebaker.....	Double	7	15	2.5	—	—	—	7	.42	.45	7	2	.45
Stutz—F.....	Double	6-8	18	8	6-8	21	2.5	6-8	2	.42	—	—	—
Trumbull.....	Double	6	6	1	6	2	1	6	5	1	—	—	—
Velie.....	Single	6	15	2.5	6	4	.8	3	2	.4	3	2	.4
Westcott—All.....	Single	6	15	—	—	—	—	3	2	—	3	2	—
White—All.....	Double	18	21	1.25	18	4	.26	18	4	.26	18	4	.26
Winton—21.....	Double	6-8	15	2.5	6-8	15	2.5	6-8	4	.34	6-8	4	.34
Winton—21-A.....	Single	6-8	15	2.5	—	—	—	6-8	2	.42	6-8	2	.42
Zimmerman.....	Double	6	16	—	6	4	—	6	2	—	6	2	—

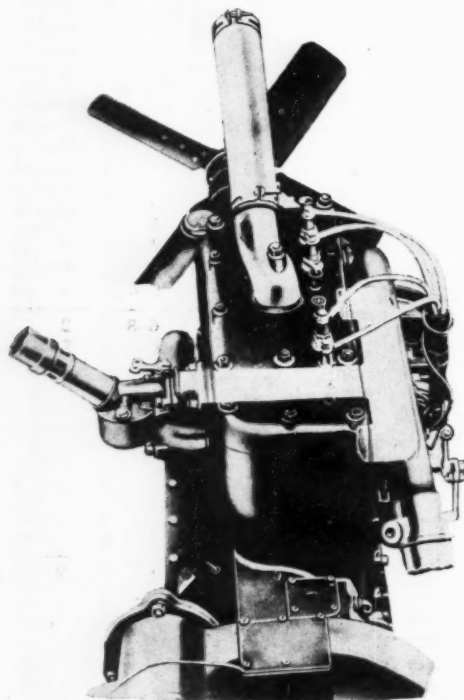
1914 Passenger Cars

Abbott.....	20	—	—	—	—	—	—	2	—	—	8	—	—
Allen.....	—	—	—	—	—	—	—	—	—	—	—	—	—
Ames.....	—	20	—	—	—	—	—	2	—	—	4	—	—
Apperson—All.....	Double	6	16	—	—	—	—	6	2	.7	6	2	.7
Arbenz.....	6	20	—	—	—	—	—	6	4	—	6	4	—
Briscoe—B-15.....	Single	12	21	—	12	4	—	12	2	—	12*	2	—
Buick.....	Single	7.5	12	—	7.5	2	—	7.5	2	—	—	—	—
Cadillac.....	Single	6.5	18	—	7	6	—	3.5	2	—	3.5	2	—
Case—R and S.....	Single	6-8	18	2½	6-8	4	.84	6-8	2	.42	6-8	2	.42
Case—O.....	Double	6-8	18	2½	6-8	4	.84	6-8	2	.42	6-8	2	.42
Chalmers—26-A.....	Double	21	21	—	21	4	—	21	2	—	21	2	—
Chalmers—24.....	Double	6-8	24	—	6-8	4	—	6-8	2	—	6-8	2	—
Chalmers—19.....	Double	6	15	—	6	3	—	6	1½	—	6	2	—
Chandler.....	Single	6-8	16	—	6-8	4	—	6-8	2	—	6-8	2	—
Davis—All.....	Single	6-8	18	—	6-8	4	—	6-8	2	—	6-8	2	—
Dodge Brothers—All.....	Double	12	16	1	—	—	—	12	2	.26	12	2	.26
Dorris—H.....	Single	7	15	2.5	7	4	.84	7	4	.84	7	2	.42
Ford—T.....	Double	6-8	15	—	Oil	—	—	Oil	—	—	—	—	—
Franklin—Series 4-M.....	Double	7	21	—	7	4	—	7	2	—	7	2	—
Franklin—Series 5-M.....	21	21	—	21	4	—	—	10½	2	—	10½	2	—
Franklin—Series 6-M.....	14	21	—	14	4	—	—	7	2	—	7	2	—
Grant—M.....	Single	6	15	—	—	—	—	6	2	—	6	2	—
Haynes—26, 27 and 28.....	Double	6-8	16	—	6-8	5	—	6-8	2	—	6-8	2	—
Hudson—40.....	Single	7	15	—	7	4	.84	3½	2	—	3½	2	—
Hudson—54.....	Single	7	15	—	—	—	—	3½	3	—	3½	3	—
Hupmobile—32-HA.....	Double	7	15	2	6	2	1	6	2	1	—	—	—
Inter-State—45.....	Double	6	21	—	6	4	—	6	4	—	6	2	—
Jeffery—All.....	Double	6-8	18	10	6-8	3	10	6-8	3	10	6-8	3	10
Kissel-Kar—All.....	Double	6	21	—	6	6	—	6	3	—	6	3	—
Lexington—6-D.....	Double	6	18	—	6	2	—	6	4	—	6	4	—

* Double contact. † Single contact. ‡ Dimmers.



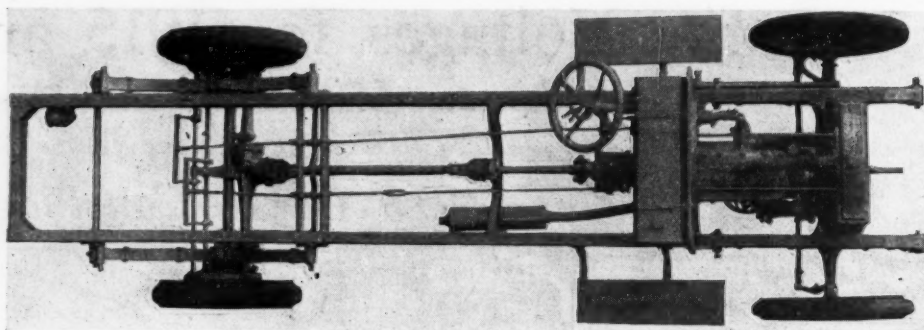
Looking down in the hood of the Fulton truck



Fulton truck, showing intake manifold as it passes between the cylinders to the hot spot and into the cylinders

A DISTINCTIVE feature of the truck manufactured by the Fulton Motor Truck Co., Farmingdale, L. I., is the arrangement for triply heating the fuel, during which process every particle of the fuel is converted into a gas before it enters the combustion chamber, it is said. This makes for economy in fuel consumption and gives an increase of power because of the complete combustion of the charge induced, the company states.

Air for the carbureter is heated by a small stove kept hot by the exhaust. Then the mixture of vaporized gasoline and warm air is heated again as it passes through a pipe between the hot firing cylinders to the intake manifold. This mani-



Airplane view of chassis of Fulton truck

Fulton Truck Triply Heats Fuel

fold is cast in one piece with the exhaust manifold, the two being separated by a thin wall. Naturally, this dividing wall is hot, and when the incoming mixture comes in contact with it, any particles of gas which may not have been volatilized are turned into vapor. This thoroughly vaporized and heated mixture passes into the combustion chamber and is ignited easily because of its high temperature.

The Fulton four-cylinder engine develops 38 to 40 hp. at 1800 r.p.m. It is of the L-head type, cast in block, with $3\frac{1}{4}$ by 5-in. cylinders. A thermosyphon cooling system with a radiator of special design and extra large core and a 20-in. fan are used. Other features of the engine are crankshaft bearings 2 by 4 in., connecting rod bearings 2 by 2 in., large water capacity, and oversize valves.

Lubrication is by combination pump and splash and is automatic. Champion spark plugs and a Simms high-tension magneto are used.

The wheelbase is 136 in. Solid tires of Firestone, Kelly-Springfield or Goodrich make are used front and rear. Front tires are 34 by $3\frac{1}{2}$ and the rear 34 by 5. A special adjustment of the front wheels allows for an extra short turning radius.

The rated carrying capacity is $1\frac{1}{2}$ tons, exclusive of the body-weight allowance of 1000 lb. The frame is of $\frac{3}{8}$ -in. heat-treated channel steel, $5\frac{1}{8}$ by $2\frac{1}{2}$ in. The frames are flexible, eliminating loose rivets. The length of the chassis over all is 200 in., with 9 ft. behind the seat.

The springs are strong, in keeping with the chassis. The front springs are 42 in. long, $2\frac{1}{2}$ in. wide and $2\frac{1}{2}$ in. thick. The rear springs are 50 in. long, $2\frac{1}{2}$ in. wide and $3\frac{3}{4}$ in. thick. They are mounted so as to take the drive and torque, relieving the driving shaft of stress and adding life to the rear axle assembly. To insure positive lubrication, all spring pins are oil grooved and drilled and fitted with grease

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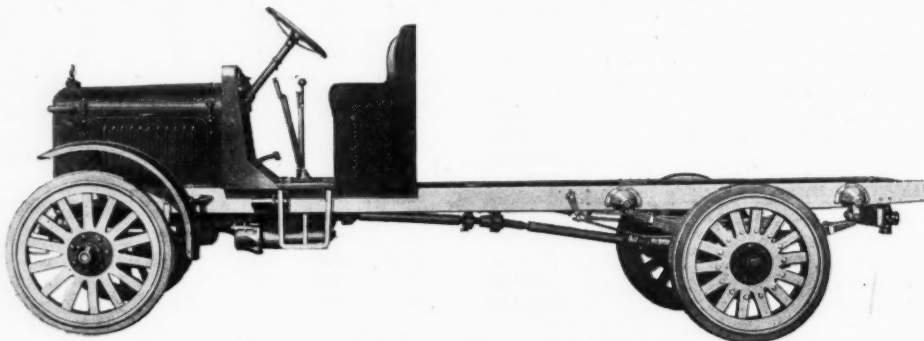
Transport $2\frac{1}{2}$ -Ton Truck on Market

THE Transport Motor Truck Co., Mount Pleasant, Mich., started business about six months ago but, owing to Government restrictions, was compelled to postpone manufacture. Now that these restrictions have been removed it is going into production. Milton A. Holmes, for four years sales manager and for two years vice-president of the Republic Motor Truck Co. is at the head of the company, which is capitalized for \$1,000,000. Production will start with 500 orders for trucks on the books, he states.

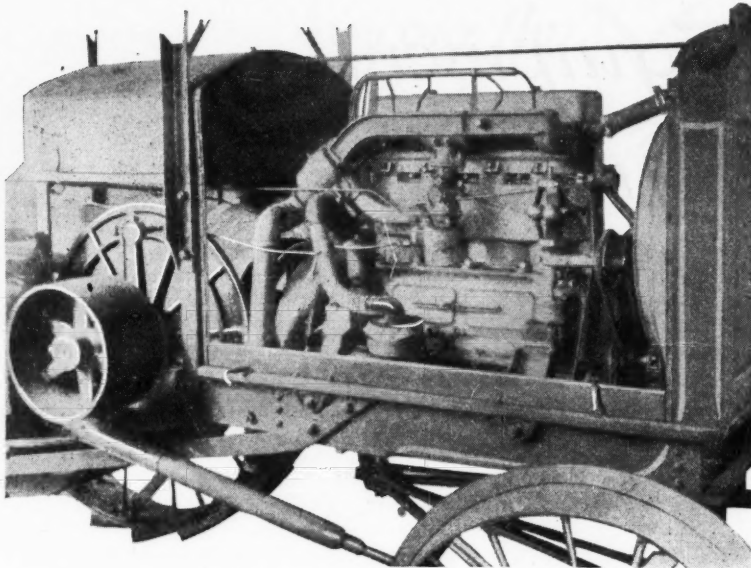
The new truck is of $2\frac{1}{2}$ -ton capacity, internal gear drive. Several have been covering all kinds of road and grade tests dur-

ing the last six months, when it has been impossible to get into active production. Such standard units as Continental engine, Eisemann magneto, Stromberg carbureter, etc., are employed in the assembly. A duplex centrifugal governor is used. The clutch and transmission are Fuller make. A Clark internal gear rear axle, Columbia front axle, Jacox steering gear and Prudden wheels are other standard units which make up this model.

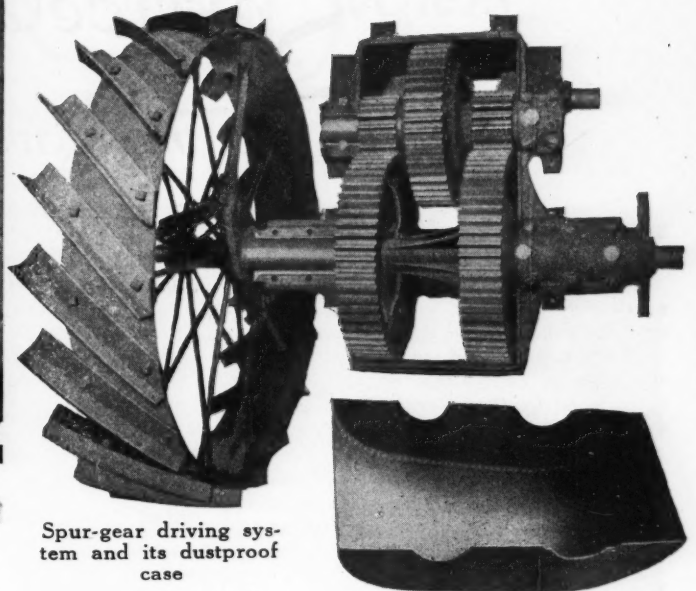
The frame is of pressed steel, and a unit powerplant is embodied in the design. The wheelbase is 150 in. Equipment includes tool kit, jack, oil lamps inside of dash, tail-light, Moto-Meter and odometer.



Transport $2\frac{1}{2}$ -ton truck now on the market



Engine and part of the friction disk transmission of Port Huron tractor



Spur-gear driving system and its dustproof case

Port Huron Has Friction Drive

THE 12-25 four-wheel tractor made by the Port Huron Engine & Thresher Co., Port Huron, Mich., is unusual in that it combines friction with spur gear drive. The friction system is reversible and variable. It comprises two driven metal disks mounted on a horizontal cross shaft. These disks, one for the forward and one for the reverse motion, by a lever under the control of the operator are brought into contact with a fiber wheel bolted to the crankshaft of the engine. This arrangement gives the tractor a forward and reverse speed range of from 1½ to 4 m.p.h.

The spur gear system consists of a main pinion on one end of the cross shaft which

transmits power to the intermediate spur gears connecting with the gears on the driving axle. The pulley is on the opposite end of the cross shaft. All gears, with the exception of the differential gear and pinions, are machine cut. The gearset is in a dust-proof case and runs in oil.

The engine is an Erd, kerosene-burning, four-cylinder, vertical, with 4-in. bore and 6-in. stroke. The valves are in the head. The engine is throttle governed by a flyball governor, and the normal speed is 900 r.p.m.

Lubrication is by splash with circulating pump. Ignition is Kingston high-tension magneto with impulse starter. Cooling is

by a system of forced circulation. The carbureter is a Kingston, and air is taken in through a Bennett cleaner.

The frame of the tractor is made of steel channels. The front axle is of the built-up type and carries a coil spring upon which the front end of the frame rests. The tread of the front wheels is 52 in. and of the rear wheels 56 in. The front wheels are 34 in. in diameter with 6-in. face, and the rear wheels are 56 in. in diameter with 10-in. face.

The tractor is 156 in. long overall, 75 in. wide, with height to the top of canopy of 8 ft. 9 in. and with a wheelbase of 93 in. Without fuel and wheel lugs, but with canopy, the tractor weighs 5700 lb.

FULTON 1½-TON TRUCK

(Concluded from facing page)

cups to retain a reserve supply of grease.

The front axle is drop-forged from heat-treated steel, I-beam in shape and built to support heavy loads. The rear axle is a Russel internal gear, with heavy dead axle carrying the load. Power is transmitted to the wheels by the driving axle, which is entirely independent of the load-carrying axle. The load-carrying axle, being independent of the driving axle, is naturally much stronger than it otherwise would be. None of the load comes on the driving connections.

The clutch is a Borg & Beck in unit with the engine and transmission. The transmission is of the selective gear type with three speeds forward and one reverse.

The emergency brake drums are 14 in. in diameter and 2 in. wide, operated by a hand lever. The service brakes are 14 by 2½ in., operated by foot pedal. Both sets of brakes act on the rear wheels.

The driveshaft is in two units to avoid the whipping of a long, one-piece shaft. The front unit is made of 1½-in. chrome-nickel steel with disk universal at front end and passing through a self-aligning ball bearing. The rear unit consists of 1¼-in. steel tube, connecting two sturdy, flexible universal joints.



Port Huron tractor which pulls three 14-in. plows

Service Equipment

Time Savers of the Shop

Babbitt Melting Ladle

THE Bottom-Pour melting ladle made by Joseph T. Ryerson & Son, 30 Church street, New York, is for babbitt and other soft materials. The construction is such that the metal is poured off the bottom of the ladle instead of the top, this being accomplished by the internal spout cast into the ladle. This eliminates the necessity of skimming the dross. The bowl is gray iron and the handles Swedes iron with a steel check nut. It is made in capacities of 4½ and 9 lb., \$1.50; 18 and 25 lb., \$2, and 40 lb., \$2.50.

New B & D Drill

The Black & Decker Mfg. Co., Baltimore, Md., has added a new size drill to its line. This has a capacity of ⅞ in. in steel and weighs 27 lb. It is equipped with a removable No. 2 Morse taper socket to take taper shank drills up to ⅞ in. in diameter. The drill measures 5¼ by 17 in. and has an offset spindle 2⅝ in. from the center of the spindle to the edge of the frame. This drill also is equipped with a light-weight, high-powered, series-compensated motor which delivers a maximum output of more than ½ hp. Its light weight and the automatic control provided by the pistol grip and trigger switch characteristic of the B & D drills make it highly adaptable to a large variety of work, it is said.

Valve Grinding Compound

The Northwestern Chemical Co., Marietta, Ohio, is marketing its valve grinding compound, the Norwesco, in double-end containers which hold 2 oz. each of fine and coarse compound, retailing at 40 cents. This particular package is intended for garage and shop use. The coarse compound is mixed specially heavy with abrasive compound, and this gives quick results to the mechanic without any possibility of the material damaging the valve or valve seat, it is claimed. Emphasis is placed on

the speed with which the material operates. Norwesco valve grinding compound also is put up in single collapsible tubes and 1-lb. cans at 25 cents and \$1 respectively. Three grades are manufactured, coarse, medium and fine. The addition of at least three new grades soon is expected. Soldering

sticks and soldering salts already have been added to the line for use in soldering electrical connections and radiator repair work. Iron cement also will be added for sealing small holes in castings, cracks in waterjackets and other iron work requiring repairs.

The Accessory Corner

Steel Truck Wheel

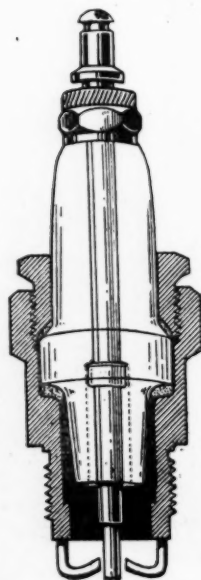
The Dayton steel wheel has a peculiar construction in its odd number of spokes and sweeping curves. This has the effect of dissipating excessive road shocks so they do not reach the axle but are distributed throughout the wheel, it is said. Spokes and rim are hollow and of uniform thickness, which results in lightness of weight. The wheel is one piece and made by the Dayton Steel Foundry Co., Dayton, Ohio.

Trufyre Spark Plug

The Trufyre spark plugs are made by the Mandel Auto Repair Co., Sioux City, Iowa.



Black & Decker ⅞-in. drill



Trufyre spark plug

The Giant type is an oversize, built specially for heavy duty. The shells are turned from 1½-in. cold rolled stock, with heavy nicked finish. The porcelain insulator, said to be impervious to oil and resistant to heat, is assembled against a copper asbestos gasket and held in place by steel bushing. The center stems are of high-resistance alloy, oversize and assembled loose within the core to prevent porcelain breakage due to expansion and contraction. The Junior type carries the same high grade of materials as the Giant and is for standard engines.

Universal Radiator Shutter

The Universal radiator shutter is a steamed sheet metal device made up of movable shutters carried in a frame of such size as to fill completely the opening in the outer shell of the radiator and is provided with a flange snugly held between outer shell and the core of the radiator. It is held immovable in this manner without the use of a bolt or other fastening. The blades are controllable from the steering column and are so designed that when in a closed position the passage of air through the radiator is completely shut off. The shutter is of heavy gage sheet metal with baked enamel finish. Installation can be made in from 15 to 30 min., it is claimed. The Ford size sells for \$7.50. Other models range in price from \$9 to \$18. The device is made by the Metal Auto Parts Co., Des Moines, Iowa.



Universal radiator shutter



Dayton steel wheel

Among the Makers and Dealers

Short Trade Notes

STEWART-WARNER Chief Engineer Dies

—John E. Genn, chief engineer of Stewart-Warner, died Dec. 15. Mr. Genn was one of the first ten members of the organization.

New England Triangle Trucks—The Eugene F. Lalley & Sons Co., Boston, Mass., has been made distributor for the Triangle Motor Truck Co. in the New England states.

Tyler Is C. A. S. Officer—A. W. Tyler has been elected vice-president and general manager of the C. A. S. Products Co., Columbus, Ohio, succeeding the late James W. Graham.

Werden Is Denby Export Manager—G. W. Werden has been appointed export manager of the Denby Motor Truck Co., Detroit. He has established headquarters in New York.

Turner-Simplicity Tractor Distributer—The Chambers Motor Sales Co., Toledo, Ohio, has been appointed distributor for the Turner-Simplicity tractor in a portion of Ohio and Michigan.

La Crosse Loses Winnipeg Manager—J. D. Ashead of Winnipeg, Man., general manager of the J. D. Ashead Co., distributor for the La Crosse tractor in the Province of Alberta, died Dec. 11 of influenza.

Storer Leaves Wire Wheel—Frank A. Storer has resigned as general manager of the Wire Wheel Corp. of America to return to his former activities in the foreign market field, with headquarters at Buenos Aires.

Crowley to Represent General Steel—The General Steel Co., Milwaukee, Wis., manufacturer of die blocks, piston rods and tool steel, hereafter will be represented in the Michigan district by D. J. Crowley, Detroit.

New Distributors for Nilson—The Peru Van Zandt Implement Co., Wichita, Kan., has been appointed distributor for the Nilson tractor in south central Kansas and adjoining territory in Oklahoma; the S. J. Taber Co., Fargo, N. D., in the south half of North Dakota and adjacent counties in Minnesota.

Park Frayer Dies on Coast—Park G. Frayer, formerly branch manager of the Kelly-Springfield Tire Co. in St. Louis, Mo., died Dec. 7, after a long illness, in Los Angeles, Cal. Mr. Frayer at one time was southern representative for the Kirt Motor Car Co., and, in the early years, with the Lull Carriage Co., Kalamazoo, Mich.

General Tire Holds Convention—About 150 salesmen and distributors from every section of the country met in Akron, Dec. 4-5, for the annual sales convention of the General Tire & Rubber Co. An elaborate entertainment program was carried out with the annual banquet at the Akron City Club. The appointment of C. J. Hazen as director of advertising also was announced.

Selden Declares Dividend—The Selden Truck Sales Co., Rochester, N. Y., has declared a dividend of 5 per cent on first preferred, payable Jan. 2, and a quarterly dividend of 2 per cent, payable to stockholders of record as of Jan. 2, 1919. Business for the company is increasing, shipments of trucks for the month ending Dec. 7 were 28 per cent larger than for any previous month in the last two years.

Traffic Truck Distributer Organizes—The Traffic Truck Sales Co., a concern to handle the trucks made by the Traffic Motor Truck Corp., St. Louis, Mo., has been organ-



A PLANT THAT FINISHES CRANKSHAFTS EXCLUSIVELY—This is a view from the factory of the Automobile Crankshaft Corp., Detroit, which is unusual in that it devotes its energies solely to the work of finishing crankshafts. Among its customers are Waukesha, Samson and Hall-Scott and Mercer, Marmon, Locomobile, Flat, Winton, Peerless, Stearns, National, Stutz, Franklin and Hupp

ized with a Maryland charter, to act as eastern distributor in the territory from New York to the Carolinas. J. Morris Wray, vice-president and general manager of the Armleder Motor Sales Co., is in charge of the Philadelphia office.

Willard Opens Boston Branch—The Willard Storage Battery Co. has opened a branch at Boston, Mass. J. J. Kennealy, one of the factory officials, is in charge. The Willard batteries were sold formerly by the W. H. & Webster Jones Co. there.

New York Packard Export Office—The Packard Motor Car Co. has opened an export office in New York under the supervision of Fred Gardway. The company now has dealers in nineteen foreign countries, including Hawaii, the Philippines and Porto Rico.

Perfex Radiator to Build Plant—The Perfex Radiator Co., Racine, Wis., manufacturing motor car, truck and tractor radiators and cooling systems, intends to start work shortly on its new \$100,000 plant in Racine, which project has been delayed by war conditions.

Best Farm Lighting Plant Salesman—E. O. Ball, Lincoln, Ill., won a gold watch offered by the Domestic Engineering Co., Dayton, Ohio, for the best record on sales of farm lighting plants. The Lincoln man was the leading salesman in forty-five Illinois counties.

Northern Foundry to Double Capacity—The Northern Foundry Co., Marinette, Wis., organized a year ago to specialize in gray-iron castings for the automotive industry, has increased its capital stock from \$25,000 to \$95,000. The company is completing enlargements which will double the capacity. Besides erecting an addition, it has taken over the plant of the Landover Motor Truck Co., Marinette, and this concern has taken new

quarters. At the annual meeting the Northern company re-elected these officers: President and general manager, J. M. Fitzpatrick; vice-president, Patrick McManus, Milwaukee; secretary, Edward J. Vanderboom, Milwaukee; treasurer, Louis E. Best, Milwaukee.

Dealer Adds Nine New Men—Further evidence that business indications are tending to an upward rise is found in the way the Henshaw Motor Co., Boston, Mass., has started to go after business. It has put on nine salesmen because the business has increased so much during the last thirty days.

Foreign Order for Turner—The Turner Mfg. Co., Port Washington, Wis., manufacturer of the Turner-Simplicity tractor, has booked an order for several hundred machines for exportation to Italy. It will require 100 flat cars to ship the order from the factory to the seaboard. The plant is now working on the contract, which will require several months to fill.

Gillette Rubber Adds to Plant—The Gillette Rubber Co., Eau Claire, Wis., which some time ago established a new department for the manufacture of solid tires, is enlarging its works by the erection of a brick addition, 40 by 125 ft.; to accommodate inspection, shipping and warehouse departments. The space thus released will be used for manufacturing.

Everwear Buys Rubber Concern—The Everwear Rubber Co., Milwaukee, Wis., organized recently with a capital stock of \$200,000 to manufacture a patented semi-pneumatic inner tire, has purchased the plant of the Petley Rubber Mfg. Co., which has been manufacturing rubber bumpers, mechanical rubber goods and specialties. The Everwear company will continue that business as a department. Andrew Steel is president.

From the Four Winds

Glimpses at the World of Motordom

NEW ZEALAND to Have Aerial Mail—An aerial mail service will be established shortly in New Zealand from Auckland to Dunedin, a distance of 700 miles. It is expected that a saving of 14 miles will be effected.

Wilmington Contemplates Later Show—Wilmington, Del., has not abandoned the idea of having a show this winter for lack of a show place. In connection with the Hotel DuPont improvements a ballroom is being constructed, and although it is not expected to be finished before next September, it is hoped it will be possible to make use of it for the show by February or March, one or two months later than usual. If a show is held this winter it is likely it will not be

confined to passenger cars and accessories but that trucks and tractors will be included, provided there is sufficient space.

College to Train Mechanics—All car and truck equipment used in the mechanic's training department at the state college, Ames, Iowa, has been turned over to the college by the Government and courses similar to those presented by the War Department since last spring will be continued. Equipment is provided for the training of 500 men, which has been about the number at Ames under War Department training.

Motor Bus on Railroad Line—The White Motor Co. has established a motor bus on a 2-ton chassis to operate on the Northfield Southern railroad between Minneapolis and

Automobile Junction, about 10 miles. It carries thirty-five persons and has 33 miles capacity. The operation is by gasoline and heating and lighting by electricity. An ordinary body is utilized, and the wheels are flanged to fit the rails. R. B. Simning, former assistant secretary for the Minneapolis Automobile Trade Association, represents this new White line in the northwest with headquarters in Minneapolis.

Texas County Plans Better Road—Navarro County, Texas, has completed plans for making the portion of the Henry Exall highway that passes through that county permanent. A committee of the chamber of commerce of Corsicana, the county seat, has just returned from Austin, where they were awarded by the state highway commission of Texas \$155,000 for the construction of a concrete highway through the county. This sum is to be met by \$130,000 from the road funds of the county.

Clearing House for Chauffeurs—A central employment bureau or clearing house for reliable chauffeurs and other employees was considered at the monthly meeting of the Motor Truck Owners' Association of Philadelphia. The association is collecting data on insurance risks on trucks with a view to opposing high insurance rates. The speakers were George L. Bailey, supervisor of transportation of the United States Navy; A. A. Ort, transportation officer of the Philadelphia Navy Yard, and Robert M. Black, Federal Department of Agriculture, bureau of markets.

All States Co-operate in Federal Aid Road Act—Legislative assent, required by the Federal Aid Road Act, has now been given by the legislatures of all states except Alabama. The Alabama legislature meets only quadrennially, and its next regular session will convene in January, 1919, at which time it is expected the necessary legislative assent will be given, according to the annual report of the Bureau of Public Roads of the United States Department of Agriculture. The governor of Alabama has assented on behalf of the state, as authorized by the act, so that co-operation by the state has not been affected adversely.

Hartford Finds Thieves Too Thick—Hartford, Conn., dealers are much aroused over the increasing number of car thefts. They propose to ask the next legislature to fix a stiff penalty for offenses of this nature. Even the commissioner of motor vehicles has taken notice of the ever increasing number of thefts and he will present certain evidence for the consideration of the incoming legislature with the idea of passing new laws. A man calling himself Otto Sanford but whose right name, according to the National Bureau of Criminal Identification, is Eisenmuth, has been sentenced to prison to not less than three and not more than four years. In company with a woman Eisenmuth stole a Buick runabout in Hartford. He drove to Springfield and was arrested in that city on complaint of the Hartford police. The charge of theft had been amended to read taking without the owner's permission which provides for a much lighter sentence. About this time word was received from the national bureau as to the man's record and he received a stiff sentence. A Buick car stolen in Hartford last March was located in Boston a few days ago.

Coming Motor Events

RACES

Indianapolis, Ind.....500-Mile Sweepstakes.....May 31

MEETINGS

Chicago.....Motor and Accessory Manufacturers' Association.....Jan. 29
Chicago.....National Automobile Dealers' Association.....Jan. 28-29
New York.....Society of Automotive Engineers.....Feb. 4-6
New York.....American Road Builders' Association.....Feb. 25-28

SHOWS

Los Angeles, Cal.....Motor Car Dealers' Association, automotive.....Jan. 11-18
Milwaukee, Wis.....Milwaukee Automobile Dealers, Inc.....Jan. 24-30
Fargo, N. D.....Implement Dealers' Association, tractors.....Jan. 22-24
Chicago.....Automobile Trade Association, cars.....Jan. 25-Feb. 1
Toledo, Ohio.....Jan. 27-Feb. 1
Chicago.....Automobile Trade Association, trucks.....Feb. 3-6
New York.....Automobile Dealers' Association, cars.....Feb. 1-8
Fargo, N. D.....Feb. 5-8
New York.....Automobile Dealers' Association, trucks.....Feb. 10-15
Kansas City, Mo.....Kansas City Tractor Club, tractors.....Feb. 10-15
Albany, N. Y.....Automobile Dealers' Association.....Feb. 15-22
Rochester, N. Y.....Feb. 10-15
Louisville, Ky.....Auto Dealers' Association, automotive.....Feb. 17-22
Newark, N. J.....N. J. Auto Exhibition Co.....Feb. 15-22
Minneapolis, Minn.....Northwestern Automotive Exposition.....Feb. 15-22
Des Moines, Iowa.....Automobile Dealers' Association, automotive.....Feb. 17-22
South Bethlehem, Pa.....Lehigh Valley Auto Shows Co., cars.....Feb. 17-24
Wichita, Kan.....Wichita Tractor and Thresher Club.....Feb. 18-22
South Bethlehem, Pa.....Lehigh Valley Auto Shows Co., trucks.....Feb. 24-27
Springfield, Mass.....Cars and trucks.....Feb. 24-March 1
Kansas City, Mo.....Motor Dealers' Association, cars.....Feb. 24-March 1
Detroit.....Automobile Dealers' Association.....March 1-8
Columbus, Ohio.....Automobile Show Co.....March 3-8
Buffalo, N. Y.....Automobile Dealers' Association.....March 3-8
San Francisco, Cal.....Motor Car Dealers' Association.....March 1-10
Omaha, Neb.....Automobile Trade Association, automotive.....March 10-15
Syracuse, N. Y.....Automobile Dealers' Association.....March 10-15
St. Joseph, Mo.....Dealers' Association.....March 12-15
Boston, Mass.....Automobile Dealers' Association, cars.....March 15-22
Brooklyn, N. Y.....Motor Vehicle Dealers' Association, cars.....March 22-29
Brooklyn, N. Y.....Motor Vehicle Dealers' Association, trucks.....April 1-5
Montreal, Canada.....National Motor Show of Eastern Canada.....April 5-12

SHOW DATES INDEFINITE

St. Louis, Mo.....Manufacturers' and Dealers' Association.....About March 1
Bridgeport, Conn.....City Battalion.....Not Decided
Cleveland, Ohio.....Cleveland Auto Show Co.....Late March or early April
Grand Rapids, Mich.....Automobile Business Association.....February
Harrisburg, Pa.....Motor Dealers' Association.....March
Hartford, Conn.....Automobile Dealers' Association.....Not Decided
Indianapolis, Ind.....Automobile Trade Association.....Not Decided
Little Rock, Ark.....Automobile Dealers' Association.....Not Decided
Philadelphia, Pa.....Automobile Trade Association.....March
Philadelphia, Pa.....Motor Truck Association.....March
Pittsburgh, Pa.....Automobile Dealers' Association.....March
Trenton, N. J.....Auto Trade Association.....March
Utica, N. Y.....Motor Dealers' Association.....March